

THE WORLD

A GENERAL GEOGRAPHY

**A REGIONAL GEOGRAPHY
FOR ADVANCED AND SCHOLARSHIP
COURSES**

**By L. DUDLEY STAMP, C.B.E., D.Lit., D.Sc.,
LL.D., V-P.R.G.S.**

Part I. THE AMERICAS

With 157 Maps and Diagrams.

Part II. AFRICA

With 117 Maps and Diagrams.

Part III. AUSTRALIA AND NEW ZEALAND

With 98 Maps and Diagrams.

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**AN INTRODUCTION TO COMMERCIAL
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**By L. DUDLEY STAMP, C.B.E., D.Lit., D.Sc.,
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With Maps and Illustrations.

PHYSICAL GEOGRAPHY AND GEOLOGY

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BY

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IN THE UNIVERSITY OF LONDON

WITH DIAGRAMS AND ILLUSTRATIONS

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PART I

GENERAL PHYSICAL AND WORLD GEOGRAPHY

A. MATHEMATICAL GEOGRAPHY

THE SHAPE OF THE EARTH

A Flat Earth. In the past men used to think that the earth was flat. Thousands of years ago the wise Greeks knew that it was not; hundreds of years ago men first sailed right round the earth in ships, almost proving that it was not. In the present century it is very common for people to travel round the earth. Nearly every week steamers arrive in England from New Zealand, having come across the Pacific and Atlantic Oceans, and every week other steamers leave Australia and New Zealand *via* the Indian Ocean. All these steamers go round the earth in an east and west direction, but it is also possible to go round in a north and south direction. That is much more difficult, because it is necessary to pass through the very cold Arctic and Antarctic regions. Only a few intrepid explorers have been able to penetrate into the heart of those cold lands, but the aeroplane has opened up an easier way of crossing them. Every day now aeroplanes leave the great airports of America and Europe on their world flights.

Although the spherical form of the earth is now a familiar idea to all, it is of the utmost importance to understand the means by which the size of the earth can be measured and the amount of the curvature known.

Proofs that the Earth is Spherical. There are many ways of proving that the earth is a sphere. Here are some:

(a) As we have said already, it is quite easy to travel right

round the earth. We can start from London, Liverpool, Southampton, or any other great port in Britain, and take a steamer across the Atlantic Ocean, through the Panama Canal into the Pacific Ocean, then right across the ocean to the ports of New Zealand and Australia. From there we can return by the same or another steamer across the Indian Ocean, through the Suez Canal and the Mediterranean Sea to Britain. In whatever direction we travel round the earth we do not find sharp edges such as we should do if the earth were flat or were shaped like a coin.

(b) We can actually see with our own eyes and measure the curvature of the earth. We always think of a great expanse of water—such as a calm sea—as being flat, but in reality it curves gradually with the earth. If we choose an area where the sea is smooth and shallow, we can take three

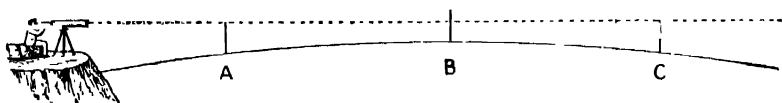


FIG. 1.—Diagram to illustrate the Bedford Level experiment.
Each pole projects the same distance above the surface of the water.

poles and drive them into the sea bottom so that in each case exactly the same length of pole appears above the surface of the water. The three poles must be in a straight line, and then if we look from the top of the first to the third through a telescope, the middle one will appear higher. Fig. 1 will help you to see why.

(c) If we watch with a telescope a distant ship coming into view we see first of all the masts, then the funnel, and finally the hull. Similarly, if the ship is moving away it is the lower part which disappears first. If the surface of the water were perfectly flat the steamer would look smaller in the distance, but one part would not go out of sight before another. In fact the large bold hull would remain visible longest.

(d) A man standing on the seashore can only see a short distance; if he wants to see farther he must ascend a hill. Draw a diagram to show why this is so.

(e) The bright appearance of the moon is caused by the

sun's light shining on her and being reflected to us on the earth. There are times when the earth gets between the sun and the moon, so that the earth casts a shadow on the moon. This is called an eclipse, and we notice that the shadow is always circular. Now only a spherical body always throws a circular shadow, and so we know that the earth must be spherical.



FIG. 2.—Diagram showing curvature of the surface of the sea

(f) The sun rises earlier for places to the east than it does for places to the west. If the earth were flat the sun would be visible at all places on the earth's surface at the same time—directly it appeared above the horizon.

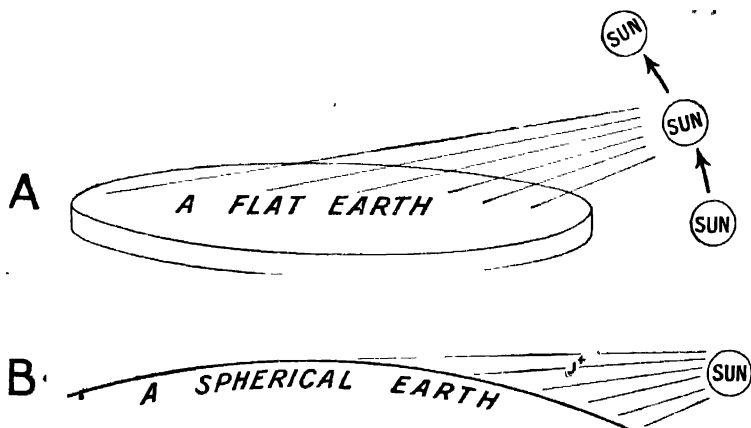


FIG. 3.—Sunrise if the earth were flat (A) ; sunrise as it actually is (B).

Shape of the Earth. Although the earth is shaped like a ball it is not quite a true sphere. It may be said, how can it be a sphere when there are high mountains and deep valleys which make the surface all rough and irregular? But even the highest mountain and the deepest valley are very, very small when compared with the great size of the whole earth. On a school globe 1 foot in diameter, the highest mountain would

be represented by a tiny grain of sand only $\frac{1}{100}$ part of an inch in diameter—only slightly thicker than the paper on which this is printed. Indeed, if a tiny piece of paper from this book were stuck on the surface of a school globe, it would show to true scale a high plateau. On a school globe there are marked the oceans, which average nearly $2\frac{1}{2}$ miles deep. Yet if a little water be poured on the surface of the school globe and allowed to run off, the film of water left behind would represent the true depth of the oceans compared with the size of the earth. So the mountains and valleys do not prevent the earth from being very nearly a true sphere, but there is another reason why it is not exactly spherical. The earth is just a little flattened at the poles, and “bulges out” a little at the equator. The earth is, in fact, unique and has been called a “geoid” or earth-shaped body!

Measuring the Earth. It is a remarkable thing that over 2,000 years ago a learned Greek named Eratosthenes, who lived in Egypt, was able to say roughly how far it was round the earth, although at that time only a small part of the world was known to him—America and Australia were entirely unknown to the Greeks in those days. Let us see how Eratosthenes calculated the size of the earth. Every day the sun rises in the east of the sky, becomes higher and higher, passes right across the sky and sets in the west. At midday (12 o'clock) it is exactly half-way and is then, as we say, “crossing the meridian.” That is to say, it is crossing an imaginary line drawn through the north and south points of the sky and passing through the point (the zenith) immediately above our heads. Eratosthenes, living in Egypt, was able to observe the sun from a place called Assuan, and on one day found that at midday it was directly over his head, or in other words, coincided with his zenith. On the same day at the same time the sun was observed from another place in Egypt called Alexandria—a long way north of Assuan. It was found that the sun there was not directly overhead, but made an angle of 7° with the zenith. Let us see from the diagram how this happens.

A right angle, shaped thus \perp , is divided into ninety divisions

or degrees. Put four right angles together like this $\begin{array}{c} \perp \\ \perp \\ \perp \\ \perp \end{array}$ and it is clear that four right angles make up a whole circle. In other words, any complete circle is 4×90 or 360° . It is thus 360° round the earth. Eratosthenes found the angular distance from Assuan to Alexandria was one-fiftieth of the great circle of the earth or roughly 7° , and he was able actually to measure on the ground the distance between these two towns. He did not measure it in English miles or in kilometres as we should do now, but he used the Greek measure called a stadium. All he had to do then was to multiply this distance by 50. So he

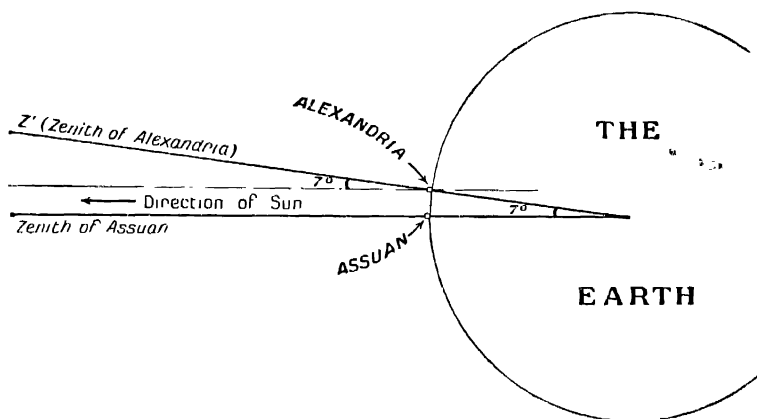


FIG. 4.—Eratosthenes' measurements.

found that the whole circumference of the earth was 252,000 stadia. In English miles this is about 30,000. Eratosthenes was not quite right, for the distance has since been much more carefully measured and found to be about 25,000 miles. It is important to remember that Eratosthenes *calculated* the distance round the earth before anyone had actually travelled round it: now we can actually *measure* the distance by detailed surveys. It is interesting to note that in the Middle Ages, often called the Dark Ages, the scientific knowledge of the ancients was forgotten and men came generally to believe that the earth was flat.

The Polar Flattening. We said above that the earth is not

quite a true sphere because it is flattened at the poles. This is proved because we find 1° measured in miles is greater near the poles than near the equator, and so forms part of a larger circumference at the poles than at the equator.

The difference is not great; the distance through the earth from pole to pole is about 7,900 miles (the polar diameter), the distance from one side of the earth to the other is about 7,926 miles (equatorial diameter). Figures are not really very important in geography, but it may be useful to know that the total surface of the earth is 197,000,000 square miles. More than two-thirds of this is water.

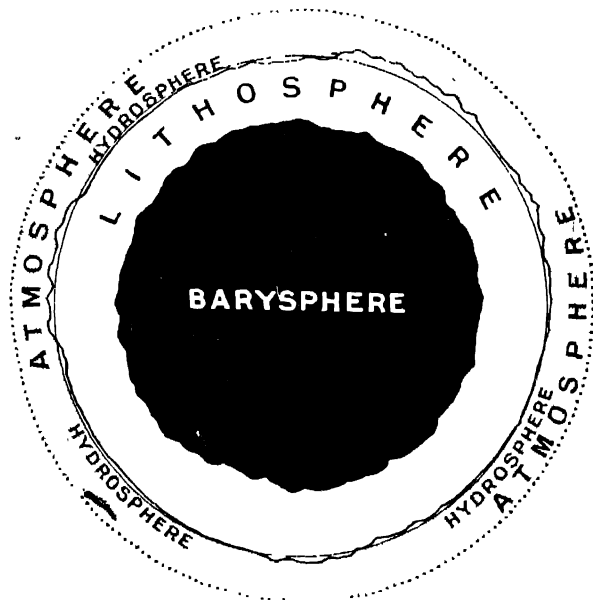


FIG. 5.—The constitution of the earth.

THE CONSTITUTION OF THE EARTH

The Weight of the Earth. It may seem impossible that the earth can be weighed, but it has been done—or, more correctly, the weight of the earth has been found by calculation. The weight is so enormous that expressed in tons the number of 0's required would take up about half a line of this book. There

is a simpler way of expressing the weight. Let us try and imagine a ball the same size as the earth, but consisting entirely of water—a solid ball of water. As a result of “weighing” the earth it was found to be about five and a half times as heavy as a solid ball of water. This is what we call the density of the earth—about $5\frac{1}{2}$. When we take the rocks which make up the solid crust of the earth on which we live, we find that in general they are only about two and a half times as heavy as water. So we know that the centre of the earth must consist of a solid mass of metal, probably iron, with a density of about 7.

Constitution of the Earth. We can picture the earth as consisting of three shells, one inside the other, enclosing a very heavy solid centre which we call the *barysphere*.* Surrounding this is the solid crust of rocks on which we live, called the *lithosphere*. Then the covering of waters round the earth (the Oceans) forms the *hydrosphere* or water sphere. This is very thin compared with the lithosphere and the lithosphere projects through it so as to form the Continents. Then surrounding the whole is the air or *atmosphere*. In recent years we have learnt that the atmosphere itself is complex and the upper part is called the *stratosphere*.

THE SOLAR SYSTEM

It used to be thought that the earth was fixed and that all the stars moved round it. But the stars seemed to move about in all sorts of curious directions, and it was the astronomer Galileo who discovered that it was the sun which was fixed and the earth was moving round the sun. We now know that the sun is fixed and that moving round it are a number of large spheres called *planets*, of which our earth is one. The other planets appear to us as big “stars” in the sky. No doubt if we could live on one of the other planets such as Mars, the earth would appear to us as a big star. All the planets are moving round the sun; but they do not all move round at the same rate. The earth takes one year to move round the sun, causing the seasons. The earth is 93,000,000

* From a Greek word “baros,” meaning weight. Modern research suggests it may be fluid in the centre.

(93 million) miles from the sun; some of the other planets such as Venus and Mercury are nearer the sun, the others (Mars, Jupiter, Saturn, Uranus, and Neptune) are farther away. It will help us to realise the huge distance from the earth to the sun if we imagine a very fast train going day and night at sixty miles an hour from the earth to the sun. It would take more than 175 years to do the journey.

Moving round the earth is a much smaller body—the moon. Another planet, Neptune, has a moon of its own, whilst others have more than one moon. Jupiter has four chief moons and

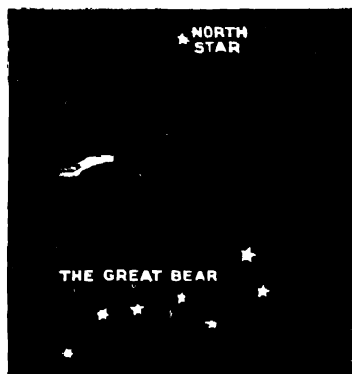


FIG. 6.—The constellation of the Great Bear and the Pole Star.

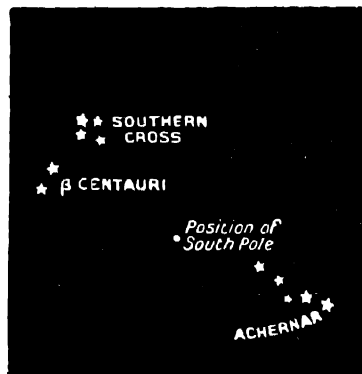


FIG. 7.—The Southern Cross and the position of the South Pole

five smaller ones, and Saturn nine. Compared with the sun, the moon is quite near the earth—only 240,000 miles away. Compared with the great size of the sun, the earth is very, very small. If we represent the earth by the head of a small pin, the sun would be shown by a big ball (six inches or more in diameter) at the other end of a very large room.

The Stars. Quite different from the planets are the stars, which are very much farther away and do not move round the sun. They appear to us to be fixed; the only motion which they appear to have is that due to the rotation of the earth.

The stars are very useful in enabling us to ascertain position

or direction on the earth's surface, especially the stars near the two poles (that is, directly overhead at the earth's two poles). The Pole Star is the star which very nearly marks the position of the North Pole and which people in Europe and other parts of the Northern Hemisphere use to show them the north. Near the South Pole is a group of four stars (or constellation) arranged in the form of a cross and which is called the Southern Cross. The longer axis of the Southern Cross points nearly due south. If this axis is continued to 4½ times its length we reach a point nearly over the South Pole.

THE MOVEMENTS OF THE EARTH

The earth has two important movements: it turns round on its own axis once every day, causing day and night; it moves round the sun once in every year, causing the differences between the seasons.

The Rotation of the Earth on its Axis. Have you ever been in a boat crossing a river? If you have, you will remember how the land appears to be moving away upstream while you are quite still. Really it is you who are moving, the river is carrying you downstream while the land remains fixed. Similarly, sometimes when we are in a railway train starting from a station, the houses and buildings seem to be moving in the opposite direction. So it is that to us on the earth the sun appears every day to rise in the east, move up into the sky, and then sink down into the west. Really it is not the sun which moves, but we who are on the surface of the earth. The sun *appears* to move from east to west, really it is the earth moving round on its axis from west to east. The axis of the earth is an imaginary line joining the North and South Poles through the centre of the earth. A school globe is made so that it revolves on this axis. Notice that if we live near the equator we move round a great distance in one day (along A, B, C, D on Fig. 8), but if we could live at the North or South Pole the only result would be that we should be turned round once in a day.

The Inclination of the Earth's Axis. A school globe is usually suspended so that the axis of the earth is not placed in an upright position, but sloping to one side. This angle, or slope, which we call the inclination of the earth's axis, is shown on the school globe for a very important reason. If a globe be placed at one end of a long table, and at the other end a lamp is hung or placed exactly on a level with the centre of the earth, the lamp can represent the sun. But remember the sun is really an enormous distance away, and is very, very much larger than the earth. The point to remember is the inclination of the earth's axis relative to the position of the sun. When the globe is arranged thus, turn it round on its axis and notice how day and night are caused. Try and find a place on the globe which will be in the dark (*i.e.* not receiving light from the lamp) the whole time, and other places where the light falls the whole time.

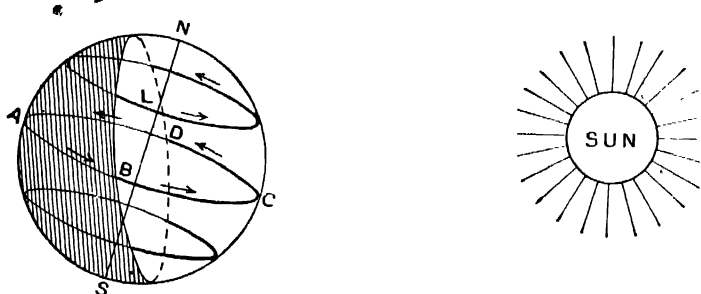


FIG. 8.—How day and night are caused.

The Movement of the Earth round the Sun. The earth's path round the sun is called its orbit. Its orbit is nearly, but not quite, a circle, so that at one part of the year the earth is slightly nearer the sun than at other times. Although the earth moves round the sun once every year, the earth's axis is always inclined in the same direction. It is most important to understand this clearly. It can best be appreciated by imagining the sun to be in the middle of the classroom. If the globe is then moved right round the room, that is, right round the sun in the centre, we shall be imitating the earth's movement round the sun every year. But when we move the globe, we

must keep it so that the axis is always leaning over or inclined towards one particular end of the room. This is shown roughly in Fig. 9.

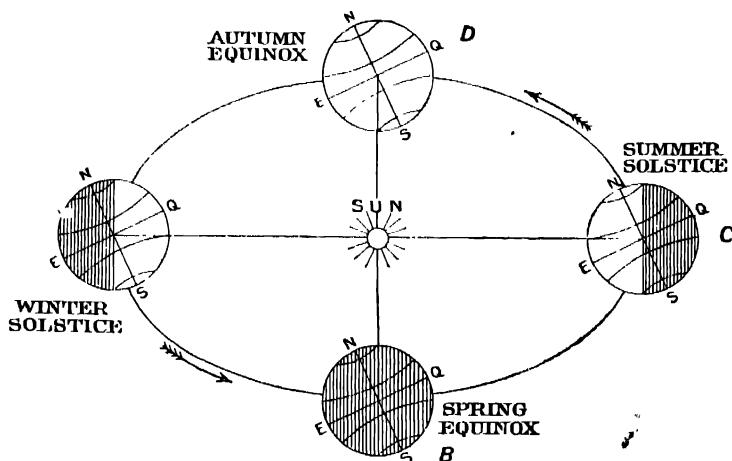


FIG. 9.—The movement of the earth round the sun.

When the globe is in position A we can find a spot which is directly facing the light, *i.e.* directly under the sun. Rotate the earth and we shall find there is a line along which all places come directly under the sun once a day, thus:

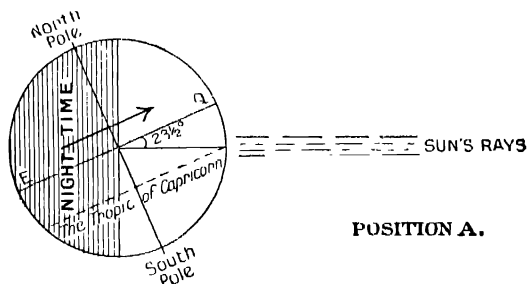


FIG. 10.—The Tropic of Capricorn.

The arrow shows the direction of the rotation of the earth on its axis.

We call this imaginary line the Tropic of Capricorn. It is usually marked by a dotted line on a globe.

When the earth is in position C we can trace out another line in quite a different position, thus:

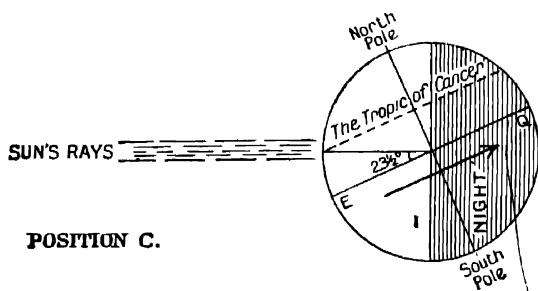


FIG. —The Tropic of Cancer.

We call this the Tropic of Cancer.

When the globe is half-way between these two positions, we find that the line traced out in the same way is half-way between the two poles and is the line we call the equator.

The earth is in position A with the sun at midday shining vertically over the Tropic of Capricorn on December 22, which is midwinter in the Northern Hemisphere. Notice that at this time a man standing at the North Pole would not see the sun at all. The sun is shining vertically over the Tropic of Cancer on June 21 or midsummer in the Northern Hemisphere. Mid-way between the two we have the equinoxes—March 21 and September 22—when the sun is shining vertically over the equator. These differences are the cause of the seasons. In the Southern Hemisphere the seasons are the opposite: December 22 is called the Summer Solstice and June 21 the Winter Solstice.

LATITUDE AND LONGITUDE AND TIME

Latitude. When we are on land we can fix our position on a map by observing prominent places or landmarks and finding them on the map. But if we were at sea there would be no such landmarks, and we should not know if we were near land or a long way from it. For this, and for many other reasons, it is necessary to imagine a series or network of fixed lines over the surface of the earth. There are certain points

on the earth's surface which are easily defined. First there are the North and South Poles, and these form two important points. Running round the earth half-way between the two poles we imagine a line which we call the *Equator*. If we went from the equator to the North Pole or to the South Pole we should go through a quarter of the whole circle or circumference; that is, through one right angle or 90° , and so from the equator to the poles we mark off ninety divisions, each forming one degree. We can draw lines round the earth parallel to the equator through each of these divisions. These lines are called *parallels of latitude*.

Notice that each parallel of latitude forms a circle with the pole as centre, but the circles get smaller as we go from the equator to the poles. We start numbering the parallels of latitude at the equator, which is called 0° , till we reach the poles, which are 90° . When we talk about low latitudes we are referring to the parts of the earth near the equator; high latitudes are near the poles. In between the two we talk about mid-latitudes. Those north of the equator form north latitude, those south, south latitude. Each degree of latitude can further be divided into sixty divisions called minutes. Each minute can be divided into sixty seconds. The latitude of a place can be defined as its distance north or south of the equator, measured as an angle whose apex is at the centre of the earth.

Longitude. We have now a means of showing distance from the equator or the poles, but we must have some means of measuring round the earth. If we go round, following the equator or any of the parallels of latitude, we shall pass through a complete circle, or 360° . So we can mark off along the equator 360 equal divisions or degrees. Then we can draw lines from the North Pole to the South Pole passing

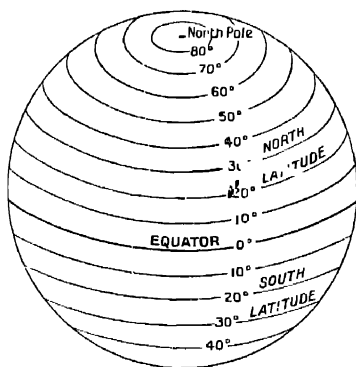


FIG. 12.—The Parallels of Latitude.

through each of these divisions. These are lines or meridians of longitude. Then comes the trouble, how shall we number the meridians of longitude? At Greenwich, on the Thames east of London, there was a famous observatory* where the stars and objects of the sky had long been studied, so it is usual to start with the line of longitude which passes through Greenwich and call it 0° . Then we number the degrees east and west of Greenwich till we reach half-way round the globe, and

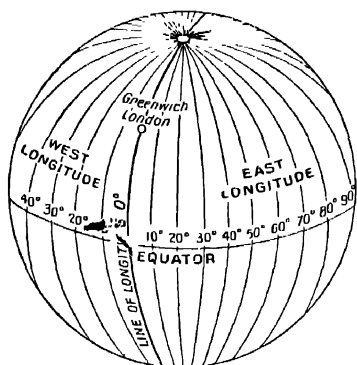


FIG. 13.—The Meridians of Longitude.

line 180° west of Greenwich is the same as 180° east of Greenwich. Just as we divided each degree of latitude into sixty minutes so we can divide degrees of longitude into minutes. The longitude of a place can be defined as its distance east or west of the meridian of Greenwich, measured as an angle.

Notice very carefully that degrees of latitude are roughly the same length over the whole world, but degrees of longitude get shorter and shorter as we travel from the equator to the poles. The average length of 1° Lat. is about 69 miles.

Some Important Parallels of Latitude. There are two important angles which are constantly reappearing in geography. They are $23\frac{1}{2}^\circ$ and $66\frac{1}{2}^\circ$. We have already learnt that the earth's axis is inclined, as we say, to the plane of its orbit. The angle of inclination is $66\frac{1}{2}^\circ$. If we subtract $66\frac{1}{2}^\circ$ from 90° we get $23\frac{1}{2}^\circ$.

If we study Fig. 14 carefully we shall see that the Tropic of Cancer, about which we have already learned, is the same as latitude $23\frac{1}{2}^\circ$ north, and the Tropic of Capricorn the same as latitude $23\frac{1}{2}^\circ$ south. The latitude $66\frac{1}{2}^\circ$ north we call the Arctic Circle, latitude $66\frac{1}{2}^\circ$ south is the Antarctic Circle.

* The Observatory has now been moved out into the country at Hirstmonceaux in Sussex.

We have learnt that at some seasons of the year a man standing at the poles would not see the sun at all during the day; at other seasons of the year the sun is shining all day and all night too. Within the Arctic and Antarctic Circles there is at least one day in the year during which the sun does not set and at least one day on which it never rises. As we get nearer the poles the number of such days increases until at the poles

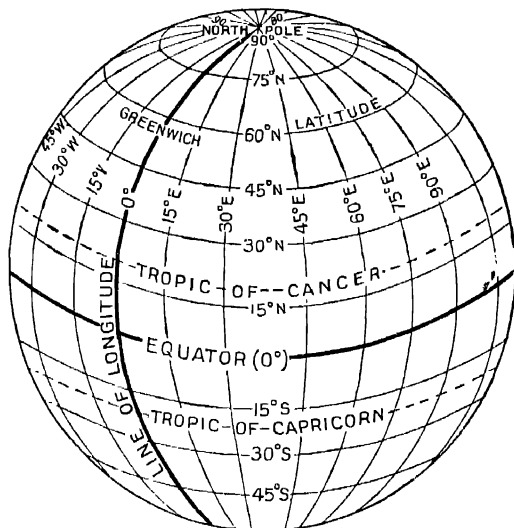


FIG. 14.—Diagram of latitude and longitude.

themselves there is darkness for half the year and sunlight for the other half. Note that outside the tropics the sun is never shining vertically overhead.

Local Time. When the sun is crossing the meridian of any place it is twelve o'clock or midday at that place, according to "local time." In other words, on any day when the sun reaches its highest point in the sky it is noon of local time. For finding accurately when the sun is crossing the meridian we have to use an instrument called a sextant. Now look at Fig. 15. It shows two places, A and B, quite close together on the earth's surface. As the earth revolves on its axis in the direction shown by the arrow it is obvious that A will come

directly under the sun before B, so that it will be noon at A before it is at B. It is only if two places are directly north or south of one another—that is, if they are on the same meridian of longitude—that they will come under the sun at the same

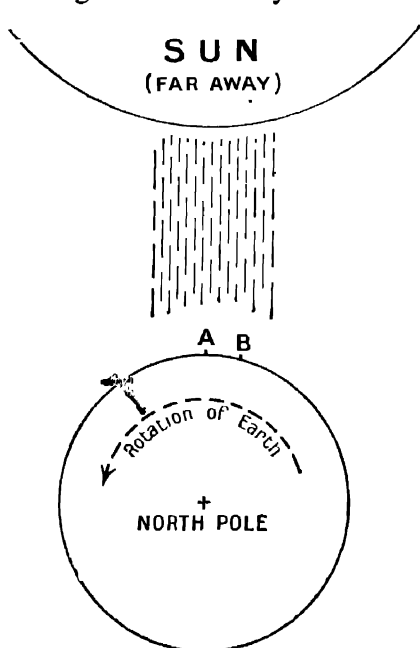


FIG. 15.—Diagram to illustrate the meaning of local time.

time, and so have the same local time. It is very important that we should quite understand this. Thus Berlin and Cape Town have nearly the same local time because they are nearly on the same line of longitude, but the local times of New York, London, and Calcutta are very different.

Standard Time. It would be very difficult if every town and village in a country had its own time, and whenever we moved from one village to another we should have to alter all our watches and clocks. So it is usual to choose for

each country or each part of a large country a standard time for use over the whole. It is, as a rule, the local time of some place near the centre of the country. Some countries, such as the United States and Canada, have more than one standard time. In Europe there are three standard times, Greenwich Time, Central European Time, and Eastern European Time. Greenwich Time is kept by all the western countries of Europe, but not all of them have “summer time” as Britain does.

Greenwich Mean Time. There is one standard time which is very important, and that is the standard time of England,

usually called Greenwich Mean Time (G.M.T.). It is the local time of the old Greenwich Observatory, which, as we now know, is on longitude 0° .

How Longitude is determined. The earth takes twenty-four hours to revolve once on its axis, and so in that time passes through 360° . Thus in one hour the earth moves 15° , or in four minutes through 1° . Now look again at Fig. 15. Suppose the places A and B are 1° apart. A will be directly under the sun (*i.e.* it will be midday local time) four minutes before B. There is thus four minutes of difference in local times for each degree of longitude. We use this fact for determining longitude. All longitudes are measured from the meridian of Greenwich, and so we use Greenwich Time as a standard of comparison. We have very accurate clocks, called chronometers, showing Greenwich time, and we compare them with local time. For each degree east or west of Greenwich there will be four minutes difference, so if the difference is eight hours, the longitude will be

$$\frac{8 \times 60}{4} = \frac{480}{4} = 120^\circ.$$

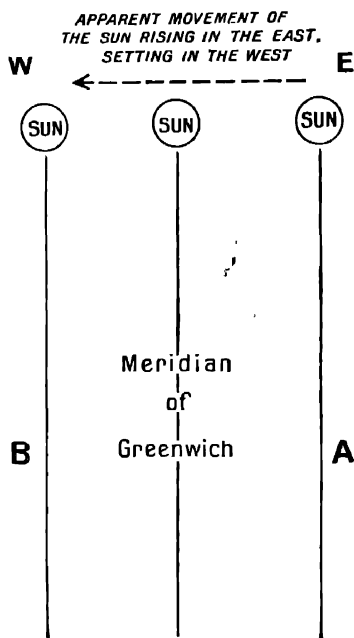


FIG. 16.

We now have to decide whether the place is east or west of Greenwich. Look at Fig. 16. If A is east of Greenwich it will be directly under the sun long before Greenwich is, and it will be noon at A when it is still early at Greenwich. So if local time is *in front* of Greenwich time, the place is *east*. Here is a rhyme which will help you to remember:

Go to the east Greenwich time is least,
Go to the west Greenwich time is best.

The International Date Line. Study Fig. 17 very carefully. Notice that when the sun is directly over the meridian of 45° E. (i.e. it is twelve o'clock noon at 45° E.), let us say on **Monday**, it will be 9 a.m. at Greenwich and at a place 179° west of Greenwich it will be four minutes past nine on Sunday evening. Work this out very carefully for yourself and see that it is correct. If we go eastwards from 45° E. instead of westwards, we find that at a place 90° E. it is 3 p.m. on Monday. At a

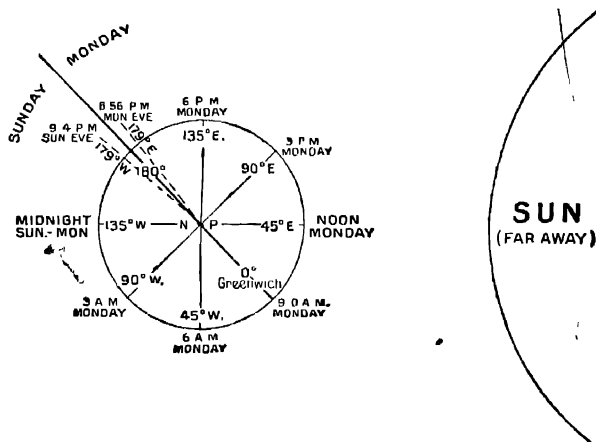


FIG. 17.—Diagram illustrating the International Date Line.

place 179° east of Greenwich it will be four minutes to nine on Monday evening. When we reach 180° we find that it is 9 p.m. on Sunday if we have calculated westwards from Greenwich, but 9 p.m. on Monday if we have calculated eastwards from Greenwich. So we have to draw a line somewhere near the meridian of 180° , and agree to say that on one side it is Sunday, and on the other side Monday. Look at Fig. 18 to see what happens when a ship crosses this "International Date Line."

How Latitude is determined. Sailors at sea find the latitude of their ship by observing the sun at midday; we can also find it by observing the Pole Star (when in the Northern Hemisphere) or some particular star.

Let us see how to do it by using a fixed star. Remember

that latitude is the angular distance of a place from the equator, and remember that the zenith of a place is the point of the sky immediately above the place. So the latitude is also the angular distance between its zenith and the zenith of a place on the equator. Similarly, the Pole Star is the zenith of the North Pole. At the equator the zenith of the pole would be

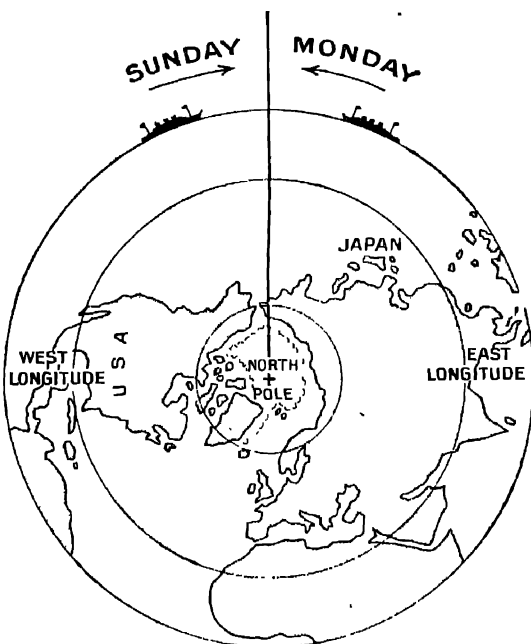


FIG. 18.—What happens when the date line is crossed.

The steamer going from the left of the diagram to the right when crossing the international date line will go from Sunday to Monday and will *lose* one whole day. The steamer going in the opposite direction will *gain* one whole day.

on the horizon; going northwards 1° or 69 miles, it would be 1° above the horizon, and so for every degree of latitude passed over the zenith of the pole rises 1° in altitude, until at the pole it would be found to be overhead.

If we use the sun at midday or other stars we measure the angle of the sun or star above the horizon with a sextant, and then we refer to a book called the "Nautical Almanac," in

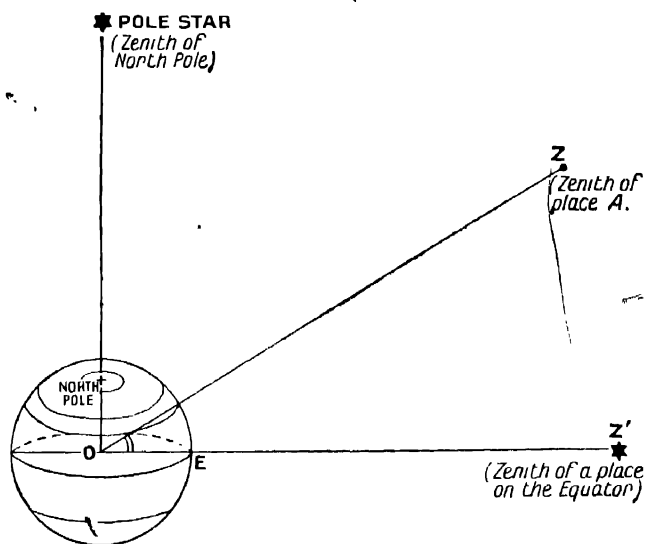


FIG. 19.—The meaning of latitude.

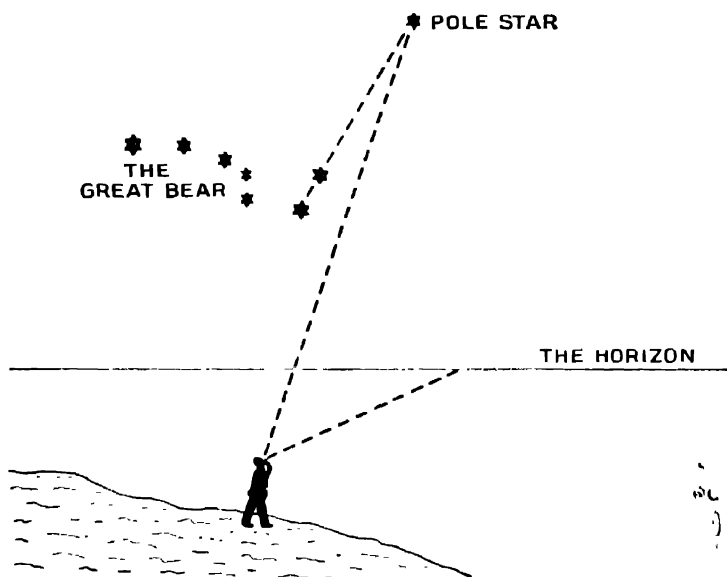


FIG. 20.—Determining latitude.

which there are tables showing how to find the latitude from this observation. This is the way in which all ships find their latitude, and so make sure that they are keeping to their proper courses and not being blown by wind or carried by currents into places where there is danger. In recent years new methods of finding position have been made possible by the development of wireless—especially by the use of “beams” and radar equipment.

True North and Magnetic North. The Pole Star is very nearly at the zenith of the North Pole, and so, in the Northern Hemisphere, if we walk in the direction of the Pole Star we are walking true north. But it is not always possible to observe the Pole Star even in the Northern Hemisphere, whilst those who live in the Southern Hemisphere cannot see it at all. So we use a compass. One end of the compass needle always points towards a point on the earth's crust which is near the North Pole. This point is called the “Magnetic North Pole.” In some countries the magnetic North Pole is almost in the same direction as the true North Pole, and so the compasses point almost true north. In other countries, such as England and New Zealand, there is often a great difference in direction between true north and magnetic north. It is a curious fact that the magnetic North Pole does not seem to be fixed, but changes slightly from year to year.

MAP PROJECTIONS

The earth is a round ball, but the maps in our atlases are flat. Unfortunately, we cannot show a curved surface properly on a flat piece of paper. If we take the skin of an orange it is impossible to spread it out flat without splitting it all round the edges. Similarly, if we take a flat piece of paper and try to spread it round a globe we cannot do so without crumpling it very much at the edges. If we want a map of a small area the earth is so large that the curvature of the earth makes very little difference. But if we want to make a map of a large area, such as a continent, the curvature of the earth makes a great deal of difference.

Look at the school globe and turn it so that India is towards you, and then stand some distance away. It will appear rather like the photograph of a globe shown in Fig. 21. Notice that only countries near the centre—India and Arabia—appear in their true shape and size. Notice that Australia and Europe near the edge of the photograph appear much smaller than they really are, and curiously drawn out in one direction. We

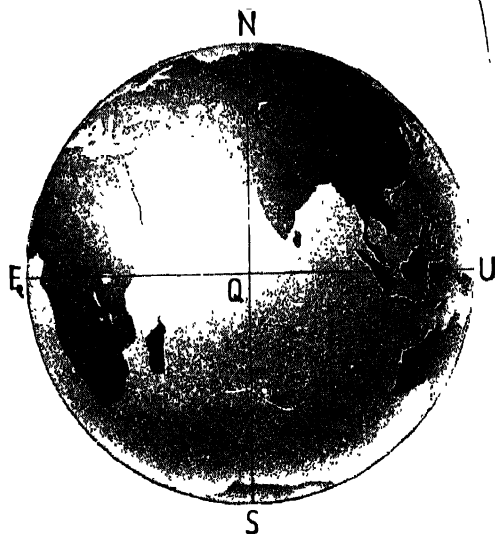


FIG. 21.—The orthographic projection

know, too, that EQU on Fig. 21 is half the earth's circumference, and is the same length as the curve ESU; but it does not appear so on the photograph. In order to make such inaccuracies as small as possible there are various means adopted to reduce the surface of the round earth to a flat surface. Different "projections" give different arrangements of the network of meridians and parallels on a flat surface.

Common Map Projections. Different map projections may have different objects in view. Some aim at always showing direction correctly. This is done in Mercator's projection, which as a result is used in maps for sailors, since directions

such as north-west, east, north, and south are represented by straight lines. Others aim at showing areas correctly. Mercator's projection makes Greenland nearly as large as Africa, but it is really only about $\frac{1}{25}$ of the size. Mollweide's Projection shows areas correctly, but the shapes of countries are very bad. Other projections aim at showing shapes correctly. For most purposes the best maps are those which take all these objects into consideration, but no single projection can satisfy all needs. Projections commonly used in atlases fall into four groups—cylindrical projections, conical projections, horizontal or hemispherical projections, and conventional nets.

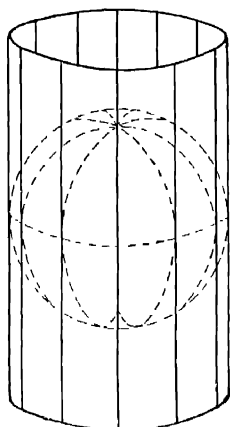


FIG. 22.

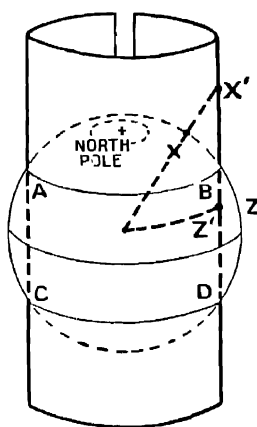


FIG. 23.

Cylindrical Projections. Here we imagine the globe surrounded by a cylinder of paper (Fig. 22), or cut by a cylinder of paper (Fig. 23), and the points of the surface of the globe are "developed" on the paper. When the paper is unrolled there is a map of nearly the whole world, but it is impossible to show the poles on such a map. The principal cylindrical projections are *Mercator's* (see maps inside covers: notice the enormous exaggeration of Greenland) and *Gall's* (Figs. 38, 39, etc.; notice that countries to the north and south appear "squashed," but that their size is not so badly exaggerated as in Mercator). The "rhumb-line" or line of constant bearing being a straight line on Mercator's projection, a

navigator would be able to draw a straight line between two ports on the map, and take his ship from one to the other by maintaining a constant direction. If we study a globe and take two ports such as Yokohama and Vancouver, we shall find, however, that this is not the shortest distance between the two. Why?

Conical Projections. Here we imagine the globe surrounded by a cone of paper (Fig. 24), the apex of the cone usually being

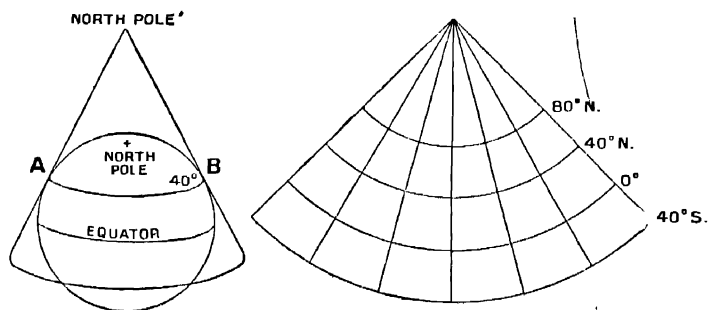


FIG. 24.—Conical projection.

placed above the pole. The line along which the cone touches the globe is the “standard parallel.” Or the cone may be supposed to cut the globe along two standard parallels (*secant conic projection*). In these projections straight lines radiating from the apex of the cone represent the lines of longitude, concentric circles the lines of latitude. These projections can only be used for part of the globe, usually for part of one hemisphere only.

Zenithal Projections. In these the surface of *each hemisphere* is developed on a flat piece of paper touching or cutting the globe. The *orthographic projection* (Fig. 21) is the map we get as if we were looking at the earth from a very great distance away. Zenithal projections are also known as azimuthal or horizontal and need not be limited to one hemisphere. They are often used for polar regions.

Conventional Nets. Some useful projections can be obtained by a mathematical development of the earth's surface. Amongst these are *Mollweide's Projection* (Figs. 99, 100) and

Bonne's Projection. The latter is like a conical projection to look at, except that the lines of longitude are curved.

MAP MAKING

The work of making detailed maps by actual measurement of the ground is called surveying. So important is this work that nearly all Governments have a special department for the making of maps. In Great Britain it is the Ordnance Survey, a Government department, that prepares and publishes a magnificent series of detailed maps. In surveying a country it is usual to fix very accurately the latitude and longitude of

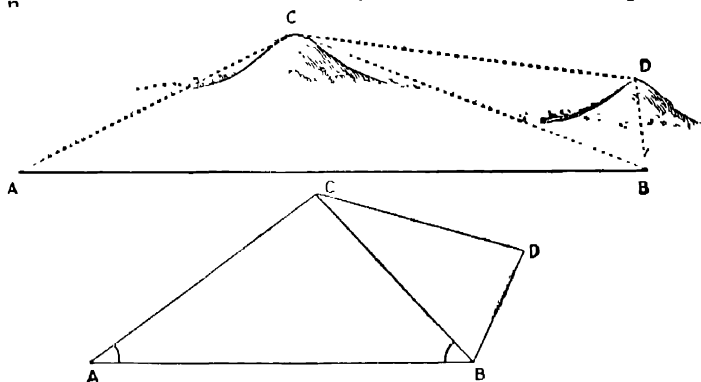


FIG. 25.—Diagram to illustrate triangulation.

one spot as a starting-point. In the survey of India, for example, Madras Observatory is the point which was used. Then a *base line* must be very, very carefully measured—that is, a straight line on flat ground. A convenient length for a base line is 1 or 2 miles. Then by means of an instrument called a theodolite we observe, from each end of the base line, some prominent point such as the top of a hill. Suppose AB in Fig. 25 is our base line and we observe the hilltop at C. By means of the theodolite we measure the angles CAB and CB \angle . We can then fix the point C on our map. From B and C we observe another point D in the same way, and so on until we have covered the whole country with a network of triangles, the corner of each triangle being some prominent

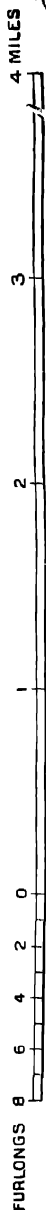


FIG 26.—A scale from a 1 inch to 1 mile map.

point, such as a hilltop. This method of measurement is called Triangulation. The details between these fixed points are filled in by "plane-table" survey. Triangulation has to be carried out very carefully and with most accurate instruments. If this is done the errors only amount to a few inches in many miles.

Scales. In making maps in this way it is most important to decide the scale. A certain number of inches on the map or paper will represent a certain number of miles on the ground. This ratio of distance on the paper to distance on the ground is called the scale. The scale may be stated or expressed in many different ways. For example, a very common scale for detailed maps is for one mile on the ground to be represented by one inch on the map. We can call this a scale of 1 inch to 1 mile. But there are 63,360 inches in one mile, so that on our map 1 inch represents 63,360 inches on the ground. We can express this as a fraction thus $\frac{1}{63360}$ (called the Representative Fraction). Any distance on the map will thus be $\frac{1}{63,360}$ th part of the true distance. In your atlas you will probably find maps on the scale of $\frac{1}{5,000,000}$, that is, one inch on the map represents 5,000,000 inches on the ground, or about 80 miles. When one inch represents a very big distance we call it a small-scale map; when one inch only represents a short distance (as 6 inches to 1 mile) we call it a large-scale map. Most of the maps in your atlas are small-scale maps. Since maps of large areas or the whole world are distorted because we cannot represent a curved surface on a flat piece of paper, we cannot always have a definite scale for a small-scale map. One inch on the map in one place will represent a greater distance on some parts of the map than on others. For this reason you will not find any scale in your atlas for a map on Mercator's projection.

In one corner of every map, where it is possible, we usually find the "scale" stated, and we also find a line marked off into divisions which represent so many miles. Look at Figs. 29, 115, for this.

Representation of Height. A map is a flat piece of paper, and so we must have some means of showing hills and valleys. There are several ways of doing this.

(a) *Contours.* On large-scale maps a very common way of showing height is by means of contours. A contour is an imaginary line passing through all points at the same height above sea-level. We can understand this more easily if we think what would happen if the sea suddenly rose. If the sea rose everywhere 100 feet above its present level, all places less than 100 feet above the present level of the sea would be covered by water. We should then have a new coastline, so that only those areas more than 100 feet above the present sea-level would still remain land. This new coastline would be the same as the present 100 feet contour line. Similarly, we can imagine the sea rising 200, 300, 400, 500, 1,000, 2,000 feet, giving us successive coastlines which would correspond to the contour lines.

(b) *Coloured layers.* A better method than simple contours, and one which can be shown on maps of all scales, is to colour differently the parts of a country between certain contours. Usually the low lands are coloured green and the higher parts various shades of brown, the darker the brown the higher the land.

(c) *Hachures.* On large-scale maps slopes may be distinguished by degrees of shading, as in Fig. 29. Where the slope is gentle the shading is light; where it is steep the shading is heavy. The lines of shading are called "hachures." On small-scale maps a variety of hachuring is sometimes used to show mountain ranges. The mountains are shown as "caterpillars." This method is not good, because we cannot distinguish between long narrow ranges and large areas of high ground, and the caterpillars hide the names of the places. There are, however, modern improvements on this method.

(d) *Photo-relief.* Another method is to show height or
w.(E.)—2

relief, by photographing a model. This is only useful to give us a general idea of the main physical features of a country or continent.

Determination of Height. This is usually done in the course of surveying by means of the theodolite.

Determination of Depth of the Ocean. This is done by means of sounding: a weight on the end of a fine wire is let down from a ship until it touches the bottom, and the length of wire is then read off. Depth is often expressed in "fathoms" (1 fathom=6 feet), and we can draw contour lines through all spots having the same depth. There are now other more modern methods of sounding or determining ocean depths. One such method is called "echo-sounding"—a sound-wave sent downwards is reflected by the floor of the ocean and records the depth on the instrument. Ships fitted with such apparatus know the exact depth of water at every part of their course.

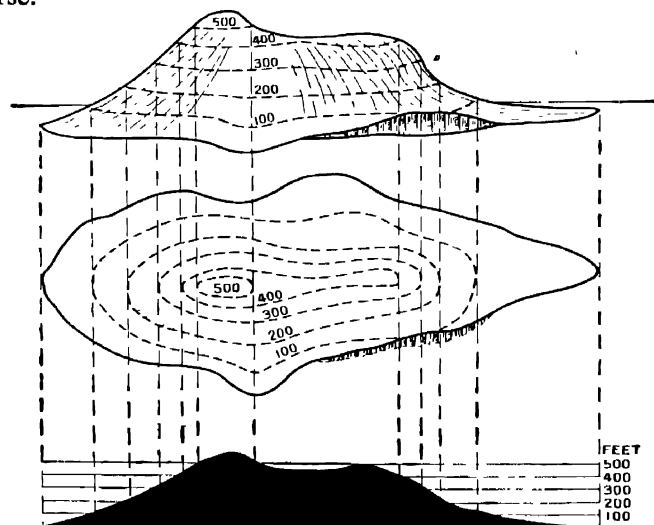


FIG. 27.—A contoured map and section.

MAP READING

The Ordnance Survey have issued several series of detailed maps of Britain. There are the large plans used by land

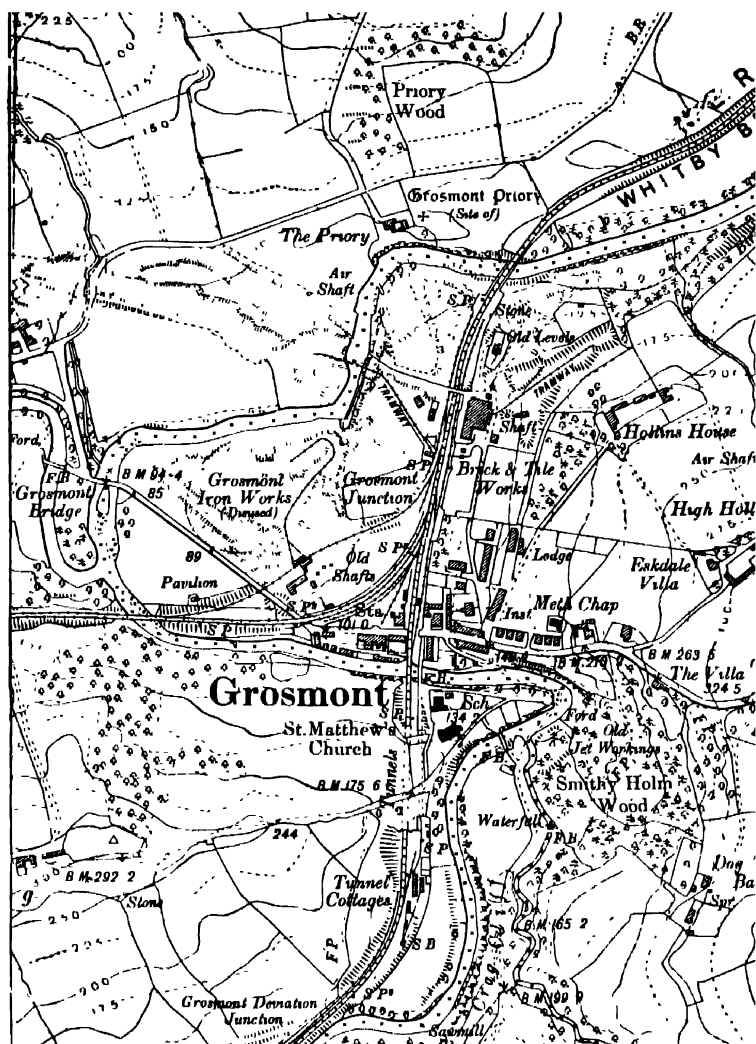


FIG. 28.—Portion of one of the Ordnance Survey Maps of Britain on the scale of 6 inches to 1 mile.

Notice that this map shows the boundaries of each field and heights are shown by contours.

(Based upon Ordnance Survey Map, with the sanction of the Controller of
H.M. Stationery Office.)

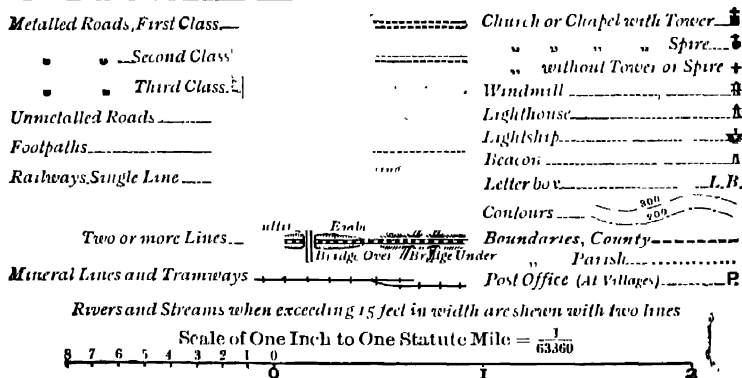
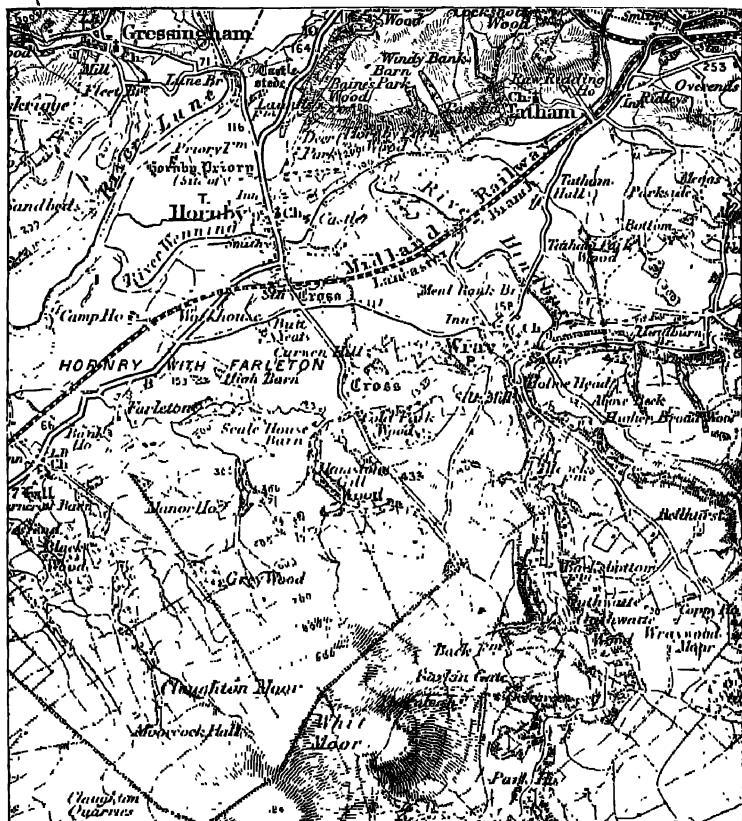
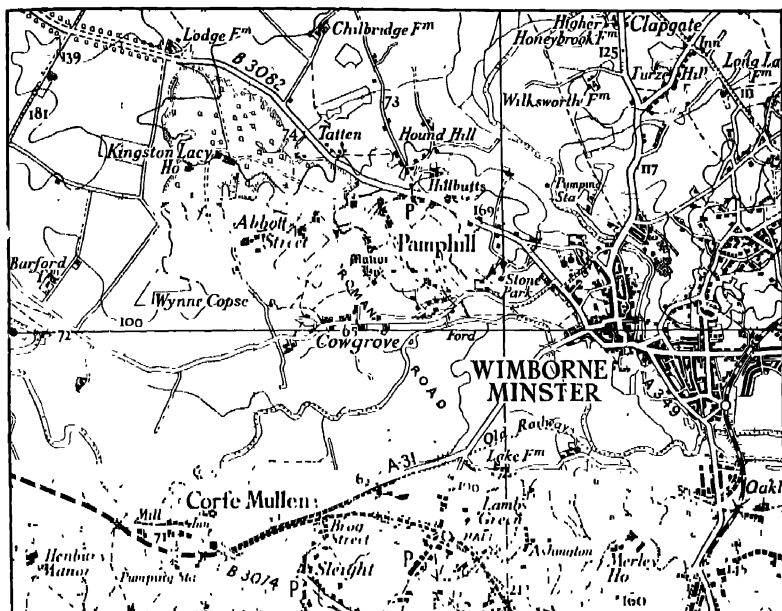


FIG. 29.—Portion of a 1 inch to 1 mile Ordnance Survey Map of England (the old Third Edition, not now used) showing the signs used.



Electricity Transmission Lines
(with pylons spaced conventionally)
Pipe Lines (water)

Arrow indicates direction of flow

Marsh

Quarry

Canal

Aqueduct

Rough Pasture

Gravel Pit

Lake

Bridge

Boundaries Parish

County

Contours at

Footbridge

County & Parish

National

50' intervals

150'

Ministry of Transport, Class 1
 " " " 2
 Roads 14 feet of Metalling and over (not classified by M of T)
 Under 14 ft of Metalling Good
 " " " Bad
 Minor Roads in towns Drives and Unmetalled Roads.
 (Unfenced Roads are shown by pecked lines)
 Footpaths & Bridle Paths
 Steep Gradients over 1 in 7 over 1 in 5

FIG. 30.—Part of a 1 inch to 1 mile Ordnance Survey map ("New Popular Edition") with contours and without hachures.

(Crown Copyright reserved)

agents, etc., on the scale of roughly 25 inches to the mile; the important series issued for the whole of the country on the scales of six inches to the mile and another about $2\frac{1}{2}$ inches to the mile, and several series on the scale of one inch to one mile. One of the latter is shown in black only in Fig. 29, and another in Fig. 30.

The "New Popular Edition" issued since the close of the Second World War has contours at 50-ft. intervals in orange, water in blue, woods in green, main or A roads in red numbered, other roads in orange. Printed over the map in black is the National Grid with lines 1,000 metres (one kilometre) apart with instructions how to use a "grid reference."

There is also an important series of Land Utilisation maps on the scale of one inch to one mile showing by colours how the land was used in 1931-9.

Sections. Fig. 27 represents an island with contours shown. Below it is a section. Notice very carefully how it is constructed. In the same way that we choose a scale for distances on a map, so we must now choose a "vertical scale" for showing heights. In some cases we can use the same scale, but usually the vertical scale is greater.

Special Maps. As we shall learn later, besides ordinary maps we can have maps drawn to show special features. All we require is just the outline of the country, and then we can show such features as the distribution of population, rainfall, temperature, vegetation, or any other features we require.

Sketch-maps. We must remember that we can never learn geography properly without knowing how to read and study maps. We must learn to draw from memory little sketch-maps to illustrate special points. We shall find a number of very simple sketch-maps in this book. Let us remember that no examination answer in geography is complete without a sketch-map or diagram. It is often possible to show more in one little sketch-map than could be stated in pages of writing.

Block-diagrams. Many books are now illustrated with "block-diagrams" which are like simple drawings of models the model being of a piece of country.

B. THE ATMOSPHERE

COMPOSITION OF THE ATMOSPHERE

COVERING the whole of the surface of the earth is the air, or atmosphere. We cannot see it, but we can feel it when it is moving (wind). If we wave a hand we can feel the air against it. In the same way, if we drop a piece of paper it does not fall straight to the ground because the air prevents it, or, as we say, offers resistance. It is because the air offers resistance that men are able to use aeroplanes. The air consists principally of two gases—oxygen and nitrogen. There are about 21 parts of oxygen and 79 parts of nitrogen. Men and nearly all animals must have oxygen, or they cannot live; it is the oxygen we breathe that keeps us alive. Just as coffee is not nice to drink unless it has been made with sufficient water, so oxygen is too strong by itself, and that is the reason why nitrogen forms a large proportion of the atmosphere. We breathe it in and breathe it out again, but our bodies do not use it as they do the oxygen. When we breathe in the air we keep some of the oxygen, but we breathe out the nitrogen and another gas—carbon dioxide—which we make inside our bodies but do not want. Thus in the atmosphere there is also a little carbon dioxide, or carbonic acid gas. Now, plants such as trees and grass cannot live without carbon dioxide. They take it in through tiny mouths (stomata) in their leaves and use it to build up their bodies, just as we use oxygen to build up our bodies. It is remarkable that what we do not want, the plants do. Too much carbon dioxide in the air will kill a man, yet plants cannot live and grow without it. Besides oxygen, nitrogen, and carbon dioxide there are small quantities of other gases in the atmosphere; by far the most important is moisture or water vapour. When a kettle of water boils we

see some of the water coming out as minute globules like a cloud (which we wrongly call steam); then it disappears into the air—that is because it has passed into water vapour which cannot be seen. When there is much water vapour in the atmosphere it feels damp as it does during warm, rainy weather; when there is only a little it feels dry as it often does in hot weather. Then we must not forget that everywhere in the atmosphere there are floating about very tiny solid particles of dust—not the coarse dust which blows from the cart roads, but very small particles which one can sometimes see when a beam of sunlight enters a room. One of these little specks forms the centre of each drop of rain, and without them we might not have fogs or mists.

We are now going to study an important characteristic of the air. Most liquids (for example, water) cannot be compressed at all or only a very little. A gallon of water becomes a little more than a gallon when it is heated, but it does not matter how much we squeeze or press we can make it but very, very little less that way. But air can be compressed. When we pump up a bicycle tyre or a motor tyre we are squeezing a great deal of air into a small space. Then, too, we must remember that air has weight.

PRESSURE OF THE ATMOSPHERE

We must picture the earth as a ball surrounded by a coat or envelope of air—the atmosphere. The upper layers are pressing down on the lower layers, so the air there is much denser and heavier, whilst in the upper layers it is thin or “rarefied.” Wherever we may be when we read this, we shall have pressing down upon us a column of air many miles high. Although we do not feel it, this column of air is exerting a pressure equal to 15 lb. on every square inch of our bodies (about 20 tons on the whole). A bicycle tyre does not burst because it is made to stand a great pressure of air inside; in the same way bodies are made to withstand this pressure and we do not notice it. But people who climb high mountains, where the air is thin, find it very difficult to live and breathe. On the top of Mount Everest (29,000 feet) the pressure is much less than one-fifth

of what it is at sea-level, and it is almost impossible to live at such a height even for a short time. Pilots and passengers in aeroplanes flying at a great height either have to wear masks, through which they receive oxygen, or the aircraft may be fitted with "pressure cabins." Since flying became important we have learnt much about the atmosphere. We now know that the lower part or troposphere extends to a height of between 20,000 and 40,000 feet (4-8 miles) above which is the stratosphere where it is clear, cold, dry, cloudless and undisturbed at all times. The tropopause is the junction between the two.

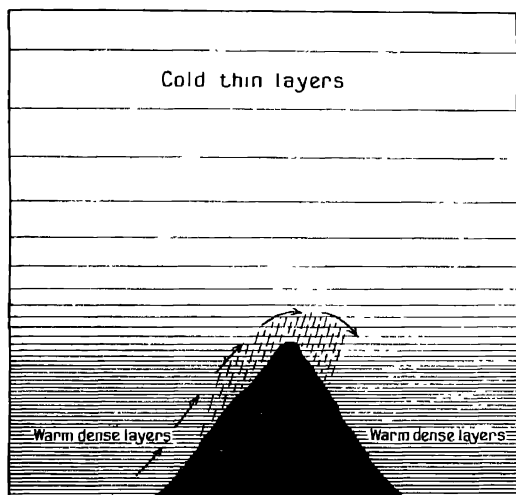


FIG. 31.—Diagram showing the layers of the atmosphere.

Even at sea-level the pressure is not the same at all places. We know this because we have an instrument which measures pressure. This instrument is the barometer (remember that the Greek word *baros* means weight, so a barometer is really a measurer of weight).

If a glass tube about 3 feet in length be closed at one end, filled with the very heavy liquid mercury, and inverted with its open end in a cup containing the same substance, the mercury will fall in the tube until its level is about 30 inches above the level of the mercury in the cup. This is because the weight of a column of the very heavy mercury is equal to and balances the

weight of the column of air many miles high. Now, as the pressure of the air varies, so the height of the column of mercury varies. When we talk about a pressure of 30 inches or of 29.5 inches we mean that the pressure of the air will balance a column of mercury of that height. On a mountain 15,000 feet high—like Mont Blanc in Europe—the pressure is only about 15 inches.*

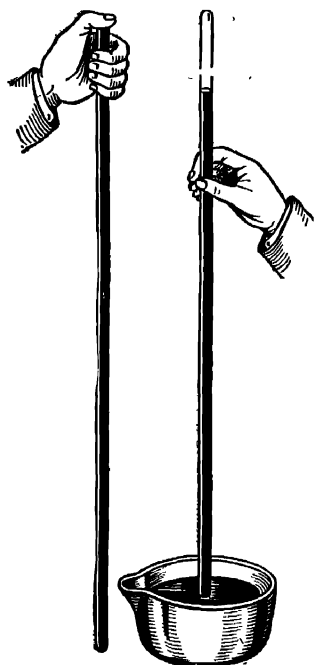


FIG. 32.—Diagram of a barometer.

The air pressure at sea-level is affected by several factors.

(1) *Temperature*. Heat causes air to expand and become less dense, and so when the temperature is high the pressure is low.

(2) *Water Vapour*. Air with much water vapour is lighter than air alone. So the pressure is often less in rainy weather when the air is damp.

If there were a uniform ocean over the whole surface of the world there would be certain marked "high-pressure belts" and certain marked "low-pressure belts," arranged as follows:

- (1) Low-pressure belt round the equator.
 - (2) High-pressure belts just outside the tropics in both North and South Hemispheres.
 - (3) Low-pressure regions over the cold regions round the latitudes towards the Arctic and Antarctic circles.
 - (4) High-pressure areas over the poles.
- (1) *The Equatorial Low-pressure Belt* is caused by the great heat making the air hot and therefore light, and by the large quantity of water vapour: the air is always damp.

* A more scientific measure of pressure is now commonly used in which the unit is the "millibar."

(2) *The High-pressure Belts.* It is reasonable to expect a belt of high pressure near the tropics, between the two belts of low pressure; and this is exactly what we do find.

(3) *The Circum-Polar Low-pressure areas* are caused largely by the rotation of the earth. The envelope of air is thin here, for the rotation swings the bulk of the air towards the equator.

(4) At the poles themselves there are high-pressure centres, probably caused by extreme cold.

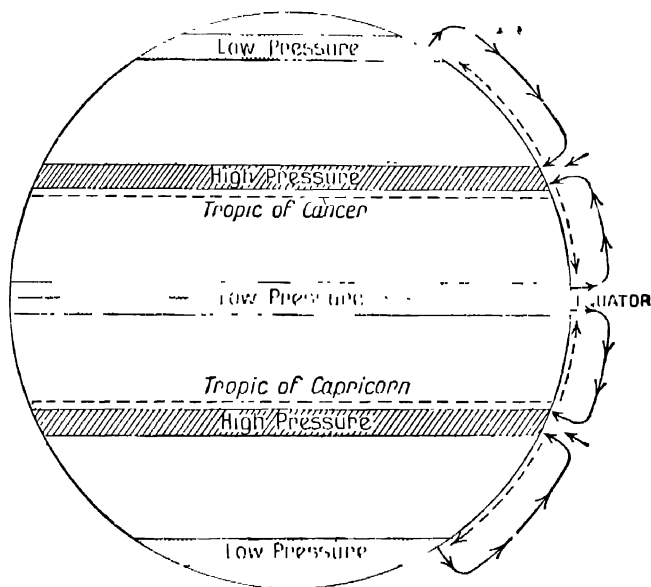


FIG. 33.—Diagram showing the pressure belts of the globe and the currents of air in the upper atmosphere.

Notice the movement of the air in the upper part of the atmosphere. The heated air of the equator rises and flows away polewards. It becomes cooled and commences to sink towards the earth along the high-pressure belts.

TEMPERATURE OF THE ATMOSPHERE

The earth's surface obtains nearly all its heat from the sun. The sun's rays do not heat the whole surface of the earth

equally. A place directly under the sun gets more heat than a place which is sloping away from the sun. At the equator, then, where the sun is overhead for a greater part of the year, the bundle of sun's rays is only spread over a small area; near the poles the sun is never overhead—the same number of rays is spread over a much larger area. The sun's rays, too, lose some of their heat in passing through the atmosphere, and notice (from Fig. 34) that the rays have to pass through a greater and greater thickness of air as one goes from the equator to the poles.

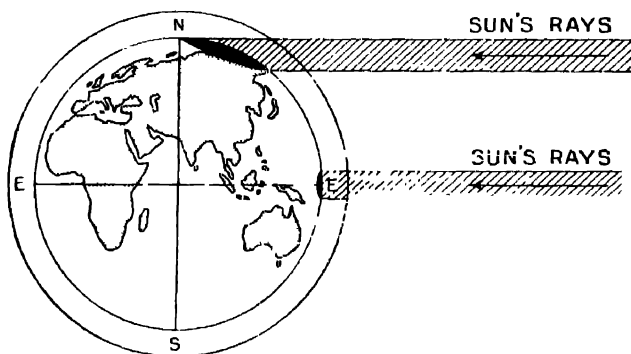


FIG. 34.

Temperature is the state of anything in respect of heat. We can say the temperature of a body or thing is high and it is very hot, or we can say the temperature of the thing is low and it is cold. But we must have a more exact way of measuring temperature, and so we use an instrument called a "thermometer." Most substances expand when they are heated. A thermometer consists of a narrow tube with a bulb at the bottom. The bulb and part of the tube are filled with mercury or alcohol. The mercury or alcohol is warmed or cooled according to whether the surrounding air is warm or cold, and therefore rises or falls in the tube. So we can mark on the stem of the thermometer little divisions. There are two very important marks on the thermometer "scale"; one is the temperature of melting ice, the other is the temperature of

boiling water. Just as weight can be measured either in French kilograms or English pounds, so there are different scales by which temperature can be measured. The two most important are the Fahrenheit and Centigrade scales. In the Fahrenheit scale the temperature of melting ice is called 32 degrees (written 32° F.), and of boiling water 212 degrees (212° F.), and between the two we have 180 little divisions (degrees Fahrenheit). In the Centigrade scale the temperature of melting ice is called 0 degrees (0° C.) and boiling water 100 degrees (100° C.), and between the two we have 100 degrees Centigrade. In this book we shall use Fahrenheit degrees. Besides the simple one there are several kinds of thermometers. The most important are the "maximum thermometer" and the "minimum thermometer." Inside one type of maximum thermometer there is a little piece of metal which is pushed up and up as the temperature rises, but which stays at the highest point when the temperature drops. This thermometer thus shows the highest temperature reached during the day or given period of time. In the minimum thermometer the little metal indicator is arranged to show the lowest temperature reached during the day. Half-way between the maximum and minimum will be the mean temperature. Temperature records must be very carefully kept for each day; each day has its maximum, minimum, and mean temperatures. The difference between maximum and minimum is the range of temperature. In some places, as in Central Asia, the nights are very cold and the days very hot. These places are said to have a great daily range of temperature. When the temperature has been recorded for every day of the month we can find the monthly average temperature—that is, the average of the mean temperature of each day of the month. Some years are hotter

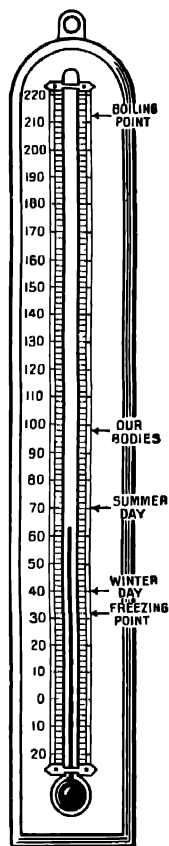


FIG. 35.—
Picture of a
thermometer.

than others, so it is much better if the observations are spread over a number of years.

Here is an example:

Place A	Year	Average January temperature
	1941	46.2°
	1942	44.8°
	1943	45.1°
	1944	45.7°
	1945	46.8°
	1946	46.4°
	1947	44.8°
		7)319.8°
		45.6° average

This table shows an average of only seven years; 35 years is the usual period for exact calculation.

Remember, then, that particularly important temperatures in geography are the monthly averages. In most parts of the world the greatest differences are found between the months of January and July, and most of the temperature maps in this book are for January and July. In the Southern Hemisphere the hottest month is usually January, in the Northern Hemisphere it is usually July. If we take the temperature of the hottest month and the temperature of the coldest month the difference between them gives us the annual range of temperature. We shall learn later that some places which have what we call an "oceanic climate" have a very small annual range—only about 5° to 15° F.; other places with a "continental climate" may have an annual range as much as 100°. Contrast London and Chicago from Figs. 38 and 39.

When we talk of the temperature of a place, we mean the temperature of the *air* at that place. We measure it normally by means of thermometers placed *in the shade* at about 4 feet from the ground.

We can, of course, measure the temperature of the ground or of water at different places, and find them quite different. On a hot day when the air is very warm, if we touch a stone we may

find it is much hotter, whereas if we put our hands in some water we may find it cooler. It is characteristic of land that it gets hot quickly (as during the day when the sun is shining), but loses its heat quickly (as during the night). Water, on the other hand, takes much longer to get hot, but longer to get cold.

How is the Air heated? We have learnt that the surface of the earth is heated by the rays of the sun. The air is heated partly by the rays of the sun as they pass through, but mainly by the land or water with which the air is in contact. In deserts where the ground gets very hot during the day but becomes cold at night, the air is also hot during the day but cool during the night, though the range of temperature of the air is not nearly as great as the range of temperature of the ground. The air over great bodies of water, such as the oceans, has a much smaller range of temperature.

The Zones. We have learnt that the heat received at the earth's surface from the sun gets gradually less as we move away from the equator. So the average temperature gets less and less, and we can divide the earth's surface into a number of zones. The hottest parts on either side of the equator form the Torrid or Tropical Zone, the coldest parts around the two poles form the Frigid Zones; between the Torrid and Frigid Zones are the Temperate Zones. We have already learnt the meaning and position of the Tropic of Cancer, the Tropic of Capricorn, the Arctic and Antarctic Circles. Notice from Fig. 37 how these lines separate the zones. First used by the ancient Greeks these

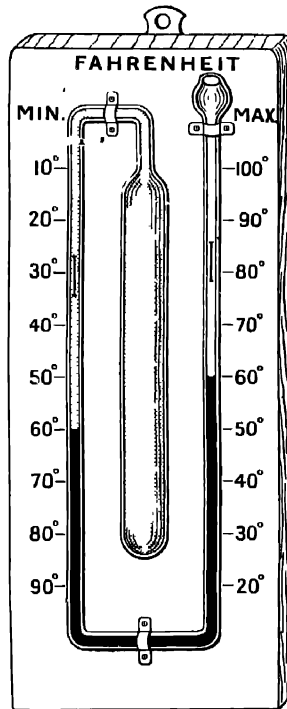


FIG. 36.—Picture of a combined maximum and minimum thermometer. There are other types.

zones are misleading. There are parts of the "Temperate" Zones which in winter are even colder than the poles themselves, so it is better to refer to "mid-latitudes."

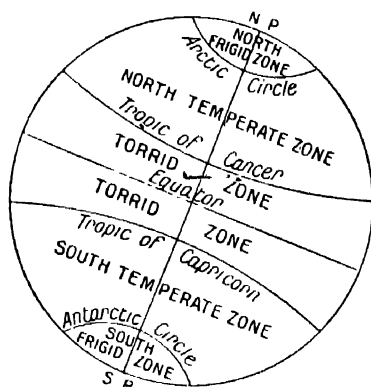


FIG. 37.—Diagram showing the heat zones of the world.

Elevation. In the winter days in England those people who live in the great cities seldom see snow, yet on the mountains it often lies for weeks together. In some countries it is so hot on the plains in the summer or hot season that all the people who can, spend their holidays in the mountains perhaps thousands of feet above the plains, where it is very much cooler.

At first it seems curious that it should get cooler as we go upwards. We can think of the air as a lot of blankets, keeping the earth warm. A man living at sea-level has the whole thickness of the air above him to keep him warm—just like a man sleeping under a pile of blankets. But when he climbs a high mountain he has much less air above him to keep him warm—just as if he had climbed above most of the blankets, and only had a few above to keep him warm. The earth is heated by the sun, but where the blanket of air is thin the warmth is quickly lost.

Roughly we find that for every 300 feet we climb upwards the temperature drops 1° , so that a place 3,000 feet above sea-level will have a temperature 10° lower than a place near by on the plains. This is called the "lapse rate," now usually expressed in degrees per 1,000 feet. It follows that the temperature of every place in the hills has what we call a "sea-level equivalent." For example, the average January temperature of the observatory at the top of Ben Nevis is 23° F. But Ben Nevis is 4,400 feet above sea-level. If we could imagine Ben Nevis to be at sea-level it would have a temperature

in January of $23^{\circ} + \frac{4400}{300}$, or $23^{\circ} + 15^{\circ} = 38^{\circ}$ F. nearly. This is the sea-level equivalent. St. Gotthard (Switzerland) has a January temperature of 18° , and is 6,900 feet above sea-level. If St. Gotthard could be brought to sea-level it would have a January temperature of $18^{\circ} + \frac{6900}{300}$, or $18^{\circ} + 23^{\circ} = 41^{\circ}$ F., which is the sea-level equivalent.

Isotherms. Isothermal is a word which means "equal as regards heat" or equal temperature. An isotherm is an imaginary line drawn to pass through all places having the

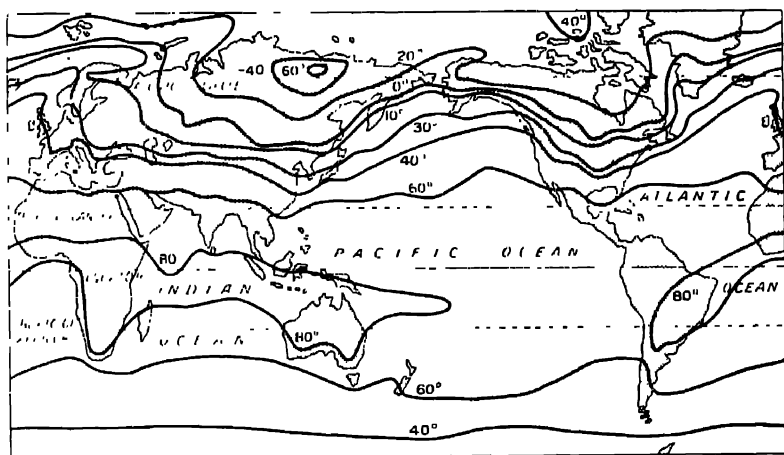


FIG. 38.—January isotherms of the world, slightly simplified.

same temperature at the same time. We can have isotherms for daily temperatures, monthly temperatures, yearly average temperatures, etc. The most important in geography are the mean monthly isotherms, especially for January and July. For example, a "January isotherm" is a line drawn to pass through all places having the same average temperature during January.

There are of course many parts of the world where places on high mountains are very close to places on lowlands, and these places have very different temperatures. If we try to draw the actual isotherms we find them very complicated though they are very important geographically. In practice sea-level

equivalents are commonly used and we must alter our definition to say that "a sea-level isotherm is an imaginary line drawn through all places having the same temperature, supposed them to be at sea-level."

Look at Figs. 38 and 39, showing the January and July isotherms for the world. These show us that the temperatures do not decrease gradually and steadily from the equator to the poles. In the Southern Hemisphere the increase is fairly regular, for there is much sea. In the Northern Hemisphere

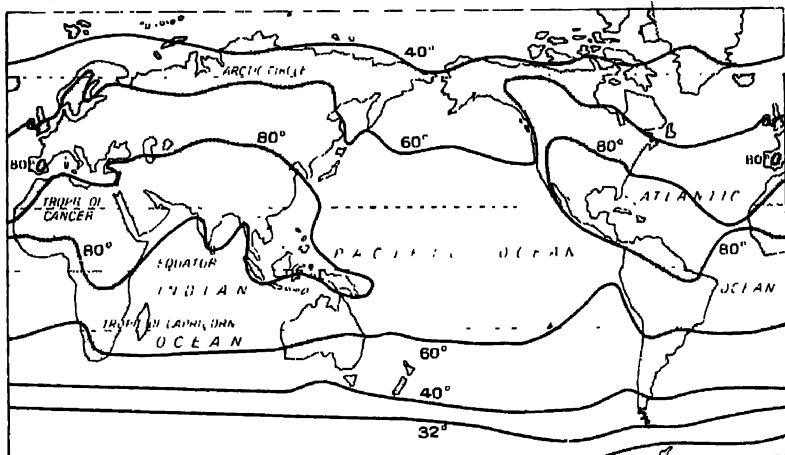


FIG. 39.—July isotherms of the world, slightly simplified.

the presence of large land masses complicates matters and the isotherms are far more irregular. We shall learn more about this important matter later.

MOVEMENTS OF THE ATMOSPHERE—WINDS

Wind is the air in motion. The principal cause of winds is difference in pressure. Air always moves from a region of high pressure to a region of low pressure. We have already learnt the main belts of high pressure and low pressure on the earth, and as the regular winds result directly from these pressure belts, we will consider them at once.

We must remember however that it is now usual to think of winds as resulting from movements of masses of air (see p. 51).

Both the high-pressure belts are regions of little wind and are called the Calms of Cancer and the Calms of Capricorn. The low-pressure belt round the equator is also a region of calm, and this belt is known as the Doldrums. Although there are no regular winds there, violent squalls and thunderstorms are frequent. If the earth were still we should have north and south winds blowing direct from a place of high pressure to a place of low pressure. But the earth is not still; it is rotating daily on its axis and moves from west to east (*i.e.* opposite to the direction in which the sun and stars appear to move). Just imagine for a minute a place on the equator. When the earth revolves once upon its axis, as it does every day, that place goes through about 25,000 miles—the distance round the earth at the equator. When we take a place north or south of the equator, that place moves *less* than 25,000 miles per day. When we get to the poles the only effect of the earth's rotation is that the spot turns right round once per day.

As a result of the earth's rotation, causing different parts to move at different rates, all winds are deflected. In this they obey Ferrel's Law, which states simply that winds are deflected to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. Taking, for example, a wind blowing from north to south in the Northern Hemisphere, if one stands with one's back to the wind, it will be seen to be deflected to the right and thus to become a north-east wind—as with the North-East Trades. Another law of world-wide application is Buys-Ballot's Law. This law states that if in the Northern Hemisphere one stands with one's back to the wind, one will have lower pressure to the left than to the right. In the Southern Hemisphere the reverse will hold. Notice very carefully that the winds are named after the direction *from* which they come.

Trade Winds. Now we can study the regular wind systems of the globe. Within the tropics, that is in the Tropical Zone, we have winds blowing from the high-pressure belts towards the equator. These are the very important Trade Winds. Some people say they were given this name in the days of sailing ships because the North-East Trade Winds blew the

European vessels across to the rich lands of the West Indies, and so helped trade with those lands, but it is doubtful if this is correct. North of the equator we have the North-East Trade Winds, south of the equator the South-East Trade Winds.

These winds are usually very regular and constant, especially over the sea, but the position of the high-pressure belts changes

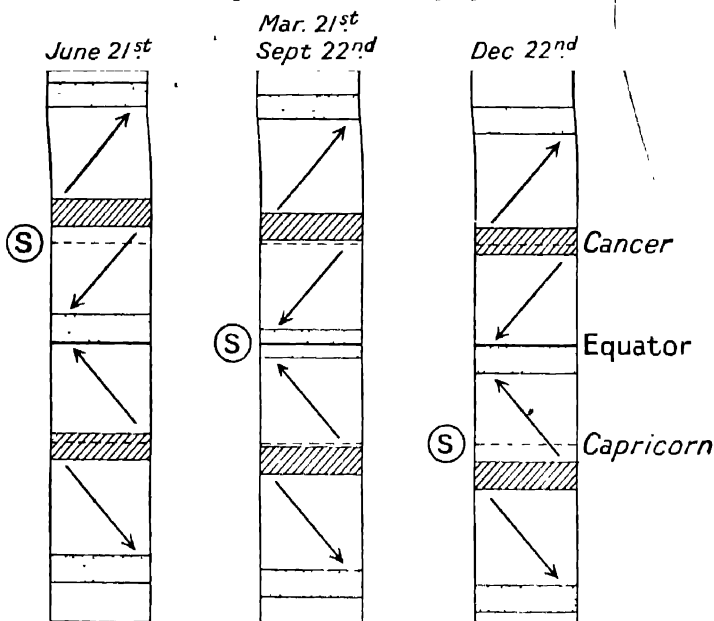


FIG. 40.—Diagram showing the swing of the wind systems. S denotes the position of the sun at noonday; the dark belts are the high-pressure belts.

somewhat according to the season. During our hot season, that is, in June, the sun is shining vertically over the Tropic of Cancer—*north* of the equator—and the high-pressure area is found well to the north, so that lands as far north as 45° come within the influence of this belt. At the same time of year the corresponding high-pressure belt of the southern hemisphere is in its northernmost position. In other words, the whole wind system of the world swings northward with the sun. In our winter, on the other hand, when the sun is shining

vertically over the Tropic of Capricorn, the whole wind system swings southward. Study this very carefully in Fig. 40.

The Westerlies. These winds blow outside the Tropics, in the Temperate Zones. In the Northern Hemisphere they blow mainly from the south-west, in the Southern Hemisphere mainly from the north-west. They are not so constant in strength or direction as the Trade Winds, and are now usually called just "Westerlies." They used to be called "Anti-Trades" because they blow in directions opposite to the Trade Winds. Notice that they swing north and south too, according to the

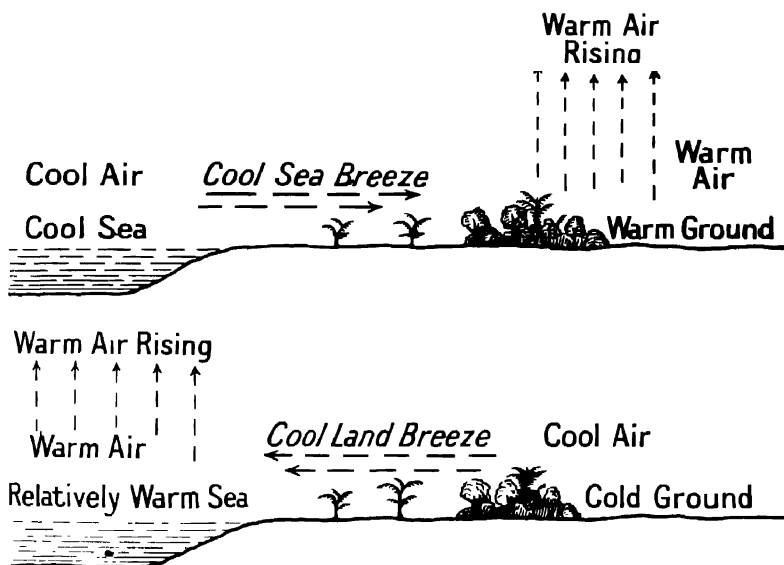


FIG. 41.—Diagram showing the cause of a cool sea breeze by day (upper diagram), and a land breeze by night (lower diagram.)

seasons. They are more regular in the Southern Hemisphere, where they are not interrupted by land masses, and may become so strong between latitudes 40° and 50° that they are known as the "Roaring Forties."

Polar Winds. During most of the year bitterly cold winds blow from the poles towards temperate regions. Where there are no mountain chains to interrupt them, these winds often

cause the climate to be bitterly cold even far to the south, as they do in the central plains of North America.

Periodical Winds. *Land and Sea Breezes.* During the day the land becomes more quickly heated than the sea. Consequently the air over the land becomes more heated too. It expands and becomes lighter, so that it is displaced upwards by cooler and heavier air flowing in from the sea. This causes a sea breeze. Many places on the sea-coast would be very hot were it not for this cooling breeze from the sea. During the

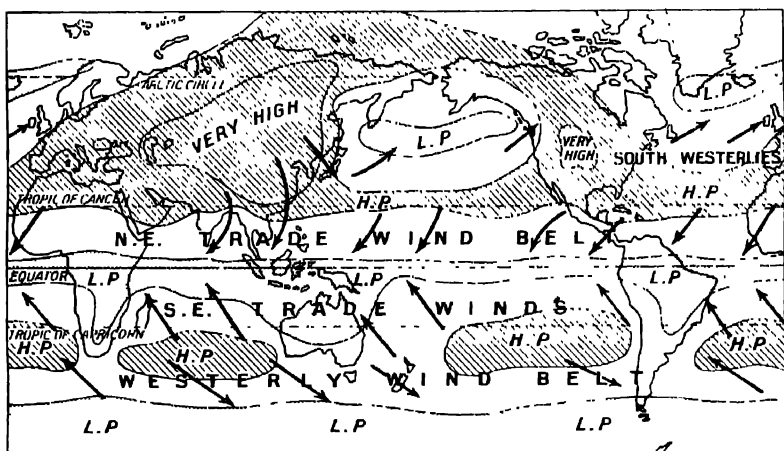


FIG. 42.—Diagram showing the pressure belts and regular winds of the world in January, and the effect of land masses on the scheme shown in Figs. 33 and 51.

night the land cools more rapidly than the sea, and some hours after sunset the air over the land is colder than the air over the sea, with the result that the cool, heavy air from the land flows out to sea as a land breeze.

Monsoons. In the last paragraph we noted that the land in getting very hot during the day caused the air above it to get hot and expand. The cool air from the sea which displaces it causes a sea breeze. On a very much larger scale we can imagine the air over a great mass of land becoming very hot during the hot weather, so that it expands and a great cool wind flows in from the sea and displaces it. This wind is a

monsoon wind. "Monsoon" comes from an Arabic word "mausim," meaning season; and in India the people talk about the monsoon as the same as the rainy season. In geography books "Monsoon" usually means the *wind* which blows at this time. In India in the hot season the sun is shining vertically over the Tropic of Cancer—that is, roughly over the great plains of the Indus, Ganges, and Brahmaputra, so that by about May the air has become very hot. Normally at this time the North-East Trade Wind—or the North-East

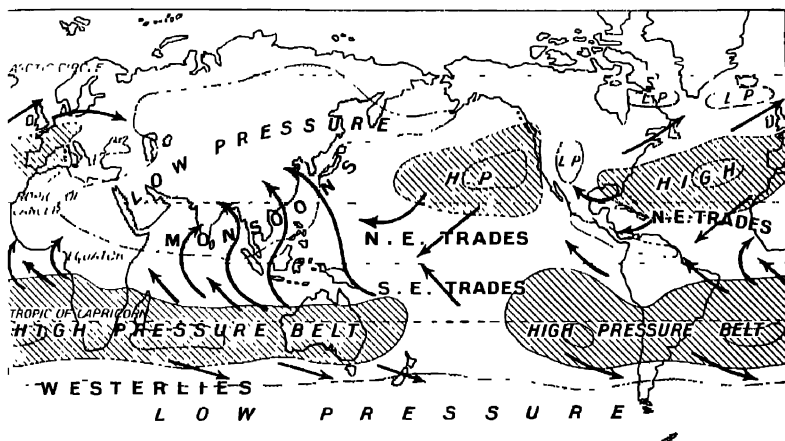


FIG. 43.—The regular wind belts of the world in July.

Monsoon as it is called in India—is blowing, but the expansion of the hot air causes this wind to die down and the South-West Monsoon commences to blow from the opposite direction. This change is accompanied by severe thunderstorms. Monsoon winds do not, of course, always blow from the south-west. In India it is easier for the wind to blow parallel to the mountain chains than across them. In China the great land mass is to the north-west and the sea to the south-east. So the monsoon blows from the south-east. India, Indo-China, China, and North-West Australia are the most important monsoon countries; but monsoon winds are also found in other parts of the world. Look at, on Fig. 43, the Indian Ocean,

and notice that the South-East Trade Wind advances across the equator and becomes the South-West Monsoon in India.

Local Winds. The presence of high mountains, hot deserts, etc., often causes winds, which receive special names in different parts of the world. Some, like the Sirocco which blows from the Sahara Desert across to Italy, are very hot; others which blow down from the mountains are very cold (*e.g.* mistral). Sometimes air descending from mountains is warmed by compression and forms the warm "föhn" or "chinook" winds.

CYCLONES (DEPRESSIONS) AND ANTI-CYCLONES

There are two main belts of high pressure round the world. In all parts of the world, however, but especially in the temperate regions, there are local areas of high pressure surrounded by regions of low pressure, or small regions of low pressure in a belt of high pressure. If we watch the waters of a river on their way to the sea, we know that the main current of water is towards the sea, but in some places the river runs swiftly, in other places very slowly, and in other places there are little eddies where the water swirls round and round as if it never meant to reach the sea. It is just the same with the wind belts of the world, especially in the belt of the Westerlies. These air swirls are caused by differences in pressure and are called depressions or lows (formerly called cyclones). A cyclone has a low-pressure centre. There are also anti-cyclones with a high-pressure centre.

Cyclones of two types may be distinguished. There are the intense local cyclones or revolving storms of tropical latitudes and the more familiar "depressions" and associated anti-cyclones which determine the weather of the British Isles, in common with that of most temperate latitudes. It is now usual to restrict the name to the first type.

Temperate Cyclones (Depressions) and Anti-cyclones. Fig. 44 shows the arrangement of isobars and winds in a cyclone and anti-cyclone in the Northern Hemisphere. The word "isobar" means "equal weight," and isobars are imaginary lines drawn through places which have the same pressure at the same time. Just as *actual* temperatures are commonly

reduced to their sea-level equivalents before isotherms are drawn, so *actual* pressure readings have to be reduced to sea-level equivalents before isobars can be drawn. Just as the whirls and eddies in a stream are partly caused by the current of water being retarded by friction along the banks, so the cyclones in temperate latitudes are due, at least in part, to the current of air in the westerly wind belts rubbing against the cold mass of air surrounding the poles—the edge of which is known as the Polar front. We can, in fact, explain the weather

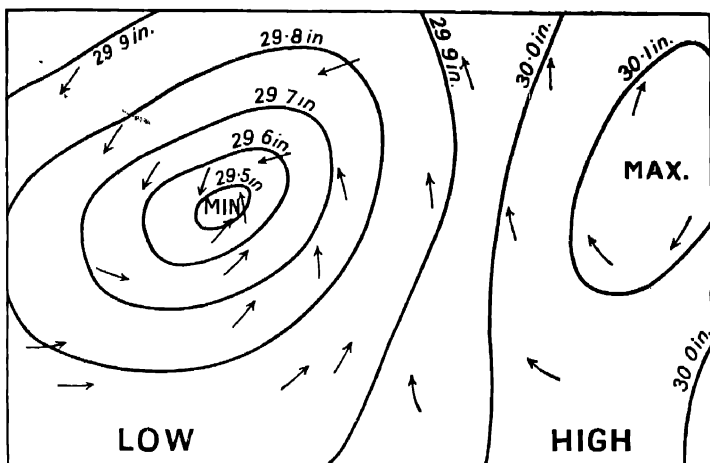


FIG. 44.—A cyclone and anti-cyclone (Northern Hemisphere).

in different parts of the world best if we think of the atmosphere as made up of different air-masses. Some of these, like the mass over the Arctic, may be stable; others, like the masses of air in the westerly wind belt, may be constantly moving. Some air-masses may be cold and dry, others warm and wet. Where two air-masses meet is a “front.”

Tropical Cyclones are small depressions having nearly circular isobars and very strong winds whirling round the centre or “eye” of the storm with a counter-clockwise motion in the Northern Hemisphere and a clockwise motion in the Southern. They are known simply as Cyclones in the Indian Ocean, as Hurricanes in the West Indies, and as Typhoons in

the China Seas. They originate within the tropics, especially where warm seas are studded with islands, or where cold and warm ocean currents meet, and are believed to be due to differential heating. A centre of low pressure would be formed over an island, under the intense heat of the tropical sun. In the tropics cyclones usually occur at certain periods—especially at the beginning and end of the monsoons in the Indian Ocean. So dangerous are the cyclones that they are avoided by



[Photo: L. D. Stamp.]

FIG. 45.—A waterspout at sea (Baltic Sea, September, 1925).

even the largest liners. The very intense local cyclonic storms known as Tornadoes have a path rarely exceeding a quarter of a mile in width; the storm dies away after a destructive passage of twenty or thirty miles. Within this path almost everything is destroyed; buildings and trees are blown down, and heavy objects are sometimes carried to a considerable distance. Tornadoes are specially feared in some parts of the south-eastern United States. When these violent storms occur at sea the funnel-shaped cloud which is formed by the whirling motion of the wind sometimes descend.

to the surface, draws up the water, and connects it with the cloud above, forming a column of water known as a water-spout. A similar action to this in the deserts of the world produces the dreaded sand-spouts or "dust-devils," associated especially with the Sahara. In the hot season in the dry parts of India or Australia ("willy-willies") violent dust storms occur and may sometimes be seen whirling along with a noise like that of an express train.

Depressions with their in-blowing, anti-clockwise winds (reversed in the Southern Hemisphere) bring wet, stormy weather, cool in summer, but muggy in winter; anti-cyclones, and the wedges of high pressure between successive lows or depressions, are associated with fine weather (but often cold and foggy in winter).

MOISTURE OF THE ATMOSPHERE

In addition to the oxygen and nitrogen of which the air is composed, there is always a quantity of water vapour present. This water vapour is obtained by evaporation of water on the earth's surface. Heat is the great cause of evaporation, and evaporation is therefore greatest near the equator. Water vapour is only just over half as heavy as air, and so it is rapidly distributed by the wind.

Hot air is very "thirsty" and can drink up large quantities of water vapour, but there comes a time when the air cannot take up any more. The air is then said to be *saturated*. We can easily tell whether the air is very dry or nearly saturated. Sometimes in the hot weather, when we have been running and feel very hot, we can watch the drops of perspiration on our arms. They do not stay there very long; they quickly evaporate into the air and disappear. That is because the air is dry and thirsty. Hang up a wet piece of cloth or handkerchief in the hot season and see how quickly it gets dry. But on a damp day in the winter the perspiration evaporates very slowly, and the piece of cloth or handkerchief may never get quite dry unless we put it near a fire. That is because the air is damp and nearly saturated, and so cannot take up any more water vapour.

Just as we have a thermometer to measure the exact temperature of the air, so we can measure the exact "dampness" of the air. The term we use for dampness is "Relative Humidity." When the air is quite saturated its relative humidity is said to be 100; when it is quite dry it is 0. In wet weather the relative humidity is often as high as 90, in dry weather often as low as 50. Now, hot air can hold much more water vapour than cold air, so that when warm damp air is cooled, the saturation point is soon reached and *condensation* takes place.

Evaporation is the name we give to the change from liquid water to water vapour; the opposite change is called condensation. Our breath is warm and contains a large quantity of water vapour. On a cold day, breathe on to a looking-glass or a plate. It will immediately become cloudy, because the water vapour from the breath has condensed as little drops of water.

The clouds which we see in the sky are formed in very much the same way. When warm moist air rises from the surface of the earth, it expands and becomes cooler, with the result that the saturation point is passed and the water vapour condenses as little drops of water which appear to us as clouds. The little drops collect together as bigger drops which may fall as *rain*. Sometimes the drops evaporate again before they reach the surface of the earth, and we may have clouds without rain. When the upper layers of the air are cold, little pieces of ice may be formed instead of drops of water and fall to the ground as hailstones. Hailstorms occur fairly commonly over the British Isles as well as in most temperate lands. In still colder regions the water vapour condenses as feathery crystals of ice called *snow*. In the tropics only those who go into the mountains, where it is very cold, see snow, for it rarely falls on the plains. In the colder parts of the world snow falls much more often than rain, and in the coldest regions rain never falls at all.

Dew. We have learnt that at night the earth may become cooler than the air above it. This causes the vapour contained in the air to be condensed and deposited on the cooled surface. In the early morning the grass and ground are often

quite wet. This deposit of water is called dew. In cold countries the surface of the earth at night may become colder than 32° F., and the deposit is frozen and called *hoar-frost* or rime. More dew is usually found on clear nights than on cloudy nights, for clouds prevent the surface of the earth from cooling so rapidly.

Fog and Mist. When the water vapour is condensed but remains suspended in the air near the surface of the earth like a cloud, it is called a mist or fog. A mist is really exactly the same as a cloud near the ground. In a fog the particles of water are smaller than in a mist or are more numerous.

Precipitation. This is a general term which includes both rainfall and snowfall as well as hail and sleet.

Essentials for Rainfall. In order to have rain two important conditions must be satisfied. First, we must have moisture-laden air; secondly, there must be some means whereby the air is cooled and condensation takes place. The air obtains its water vapour by evaporation from the surfaces of great areas of water, usually from the sea. This moisture-laden air may be cooled in two principal ways:

(a) by rising upwards into the colder upper levels of the atmosphere;

(b) by moving as wind to colder regions.

At the equator evaporation is very great, and as we have learnt, moist air is lighter than dry air and so readily rises. It soon expands, cools, and rain falls. Rains which originate in this way are called *Convictional Rains*. This explains the very heavy rainfall all the year round which is found in the Equatorial Belt. Evaporation is greatest near the equatorial belt, and that is one reason why rainfall is generally greater than in temperate regions. Apart from convictional rains, the rainfall of a country or a place depends upon the following factors:

(1) The direction of the prevalent winds. When warm winds blow towards a cooler region, the cooling of the air causes condensation and rain falls. The Westerlies of temperate latitudes blowing from warm to cooler regions bring rain, especially where they meet a cold front, whilst in the case of the Trade Winds, which blow from cooler regions

towards the equator, the heating of the air prevents precipitation, and over the oceans little rain falls.

(2) The presence of land masses, especially mountains, tends to condense the water vapour. When the moisture-laden wind reaches mountainous land it is forced to rise. In rising it becomes cooled and rainfall results. Such rains are called Relief Rains. The Westerly Winds, laden with moisture from the Atlantic Ocean, bring abundant rain to the west coasts and to the hill lands of the British Isles. We have learnt that those monsoon winds which blow from the sea towards the land are nearly always rain-bearing winds. That is perhaps why many people when they speak of "the monsoon" mean the *rain* rather than the wind.

Rain Shadow. When a moisture-laden wind is forced to rise to pass over a mountain range, it must be cooled, and is sure to lose some of its moisture. The higher the mountains the more moisture is lost. When the wind has finally passed over the range, it is almost a dry wind. Further, when the wind drops to the lower ground it is warmed rather than cooled, and so becomes a thirsty wind and not one which is ready to shed any of its moisture. That side of a mountain range which faces the rain-bearing wind and receives the rain we call the windward side; the dry side we call the lee side or leeward side. The land which is kept dry in this way by a mountain range is said to be in the "Rain Shadow" of the mountains. The rain which falls on the lee side is mainly convectional or cyclonic rain or may fall during thunderstorms (thunderstorm rain). The east coast of Scotland is in the rain shadow of the Highlands; the plain of York and the East Riding are in the rain shadow of the Pennines. On the rainy western side of England in the Lake District the rainfall is over 100 inches a year, on the dry east coast in Essex it is less than 25. Similarly a large part of the plateau of India is in the rain shadow of the Western Ghats, and so receives very little rain.

Rain-Gauge. Rainfall is measured by means of a rain-gauge. All the rain which falls over a certain small area passes into a funnel, and is collected in a jar where it cannot evaporate and where it can be measured. When we say that the rainfall for

one day has been 2 inches, we mean that if all the rain which fell that day had remained where it fell, it would have formed a layer two inches deep. In nature, as soon as the rain falls, some of it sinks into the ground, some of it evaporates, and some runs into the streams and rivers. That is why we use a rain-gauge to measure the total quantity which fell. Just as in recording temperature we take the readings every day, so we do with the rain-gauge. We note the amount which falls every day, and then by adding up the amounts for each day we get the monthly amounts. Of course, more rain falls in some years than in others and so it is necessary to take the average over a number of years. Important figures are the average rainfalls for each month or *monthly averages*, and by international agreement a standard period of 3 years is used in calculating the average. In some countries the variation from year to year is greater than in others so that *rainfall variability* is often important.

Rainfall Maps. On a map of any country we can mark the monthly or yearly averages. Sometimes it is better to use the amount for a season, such as the rainy season. Fig. 47 is a map of the world, which shows the rainfall for the months of June to August, or the northern summer. On any rainfall map we can draw lines through places having the same rainfall; these lines are called “isohyets.” It is important to remember that rainfall changes gradually. We cannot have one region with a rainfall of more than 80 inches, and the next region less than 40. There must be an area between, even if it is only a narrow strip, having a rainfall from 40 to 80 inches.

Remembering Rainfall. It is not necessary to commit to memory exact figures for rainfall. It is more important to note:

- (a) the time of year when most rain falls;
- (b) whether the rainfall is good, moderate, poor, or very poor.

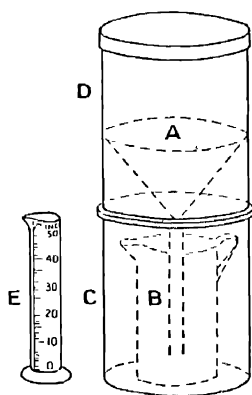


FIG. 46.—Picture of a rain gauge.

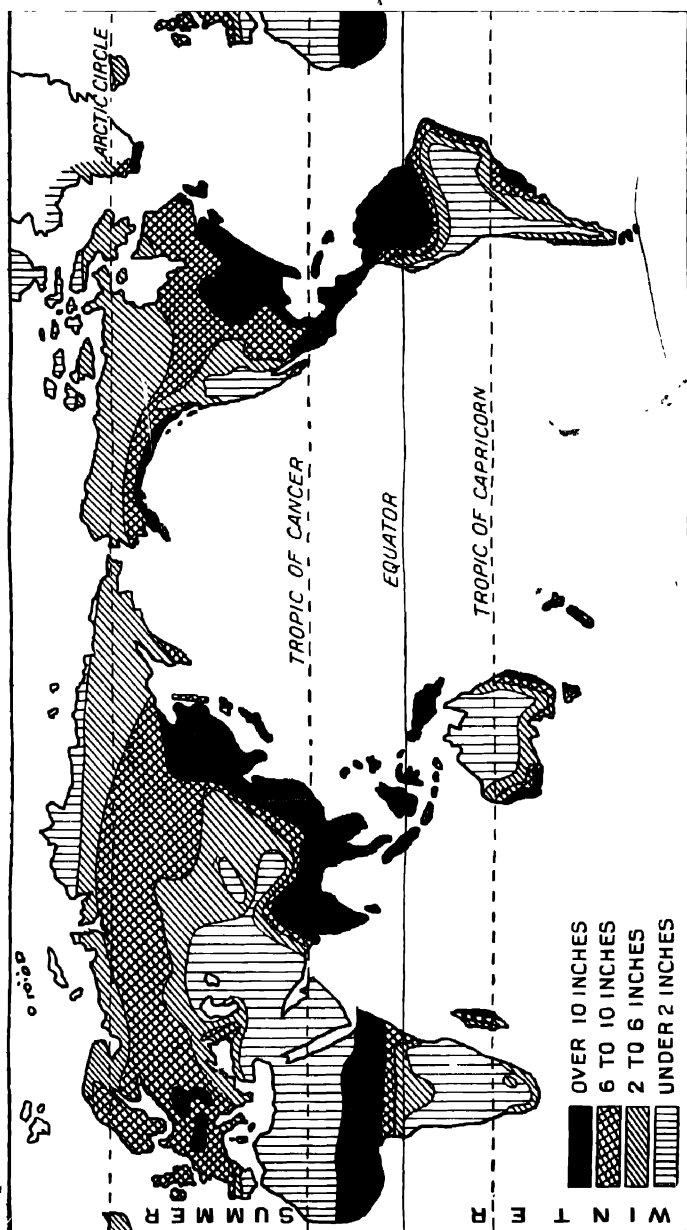


FIG. 47.—Rainfall map of the world for June, July and August (Northern Summer)

In the tropics above 80 inches is good (if much higher it may be excessive), 40 to 80 moderate, 15 to 40 poor, and below 15 very poor.

In temperate regions both evaporation and rainfall are less. Above 40 inches is good, 15 to 40 moderate, 5 to 15 poor, below 5 very poor. It is largely owing to differences in evaporation that a winter rainfall of 6 inches in the temperate areas of Australia is of more value than a summer rainfall of 12 inches in the Australian tropics.

WEATHER

We have now learnt quite a lot about the atmosphere. We have learnt about pressure and its measurement, about temperature, winds, moisture, and rainfall. If we think of any one day, all these things put together make what we call the Weather. Sometimes one element of weather seems more important than another and we can say it is wet weather to-day, or perhaps it is very cold weather, or cloudy weather. We can talk, too, about the weather for the week or month. Sometimes for a whole week we may have very stormy weather. In tropical regions such as India the weather does not change very quickly. In the middle of the dry season there may be a wet period, but not very often. In other countries, including the British Isles, the weather on one day may be quite different from that on the next. In our own town or village one day may be wet and cold, and next day cloudless, sunny, and quite hot. In such countries everybody is very interested in the weather, and many of the newspapers publish every day little maps (called weather charts) showing the state of the weather. On the oceans sailors have to watch the weather for storms, and it is important to farmers in all parts of the world.

CLIMATE

Climate is the average of the weather. We must be quite sure we understand what that means, because climate is one of the most important subjects in geography. In Britain there is summer and winter, but rain falls at all seasons of the year.

At the same time the summers are never very hot nor the winters very cold. Countries round the Mediterranean Sea have quite a different type of climate. There the year comprises a short, mild, moist winter, and a long, hot, dry summer. Every year there are these seasons. In some years the rain during the winter or rainy season is very abundant; in other years not nearly so much rain falls. But that does not make any difference to the truth of the statement that each year has its wet winter and dry summer. Sometimes we may have a hot day in the midst of the winter, and we can say that the weather for that day is exceptional. But one exceptional day does not alter climate, because the climate refers to the normal or usual condition of the weather. In the same way as we calculate average rainfall as the average over a number of years, we can find the average temperature, pressure, humidity, wind direction, and so on. These averages for a month, for a season, or for the year—all these averages considered together will tell us of the *climate*. Thus, weather refers to a short period such as a day or a week, but climate to the normal conditions over many years.

We have learned of the factors which go to make up climate, and later we shall consider the principal types of climate of the world. Before we do this we must remember that climate varies from place to place; the whole of Europe, for instance, has not the same type of climate. In the south, around the Mediterranean Sea, the rain falls mainly in the winter; over the north-west all the year round, but in the east mainly in spring and summer. When we deal with Europe in detail we shall be able to divide the whole area up into regions according to climate.

C. THE HYDROSPHERE

THE Hydrosphere is the name we give to the envelope or mantle of water which covers a great part of the surface of the globe. The great stretches of salt water we call the oceans; the smaller areas are seas, but we often talk about the "ocean" or the "sea" as meaning the whole. The great land masses are the continents, the smaller ones islands. The hydrosphere also includes lakes—stretches of water surrounded by land. Seas and oceans occupy more than two-thirds of the whole surface of the earth. Indeed, they are two and a half times as extensive as all the great continents put together. The average depth of the oceans is nearly $2\frac{1}{2}$ miles. We nearly always measure the depth of the water by *fathoms*, each fathom being 6 feet, and more exactly the average depth of the oceans is about 2,080 fathoms. This seems very deep to us—it is about equal to 2,270 men standing one on top of the other—yet it is very small compared with the great size of the earth. On the school globe 1 foot in diameter it would be shown by a thin film of water only $\frac{1}{250}$ of an inch in thickness. A thin film like this would be left if we simply poured a little water on the globe, letting all the waste water run off.

The Water Cycle. We all know that water when it is made very cold changes into ice; when it is made very hot it boils and passes into steam. We know, too, that on a sunny day a pool of water on the road quickly dries up and disappears. When a puddle of water appears to dry up like this, the water really is changed into a gas—called water vapour—and passes into the atmosphere. We have already learnt about the water vapour in the atmosphere. Just think what changes are continually happening to the waters of the earth. Over the ocean, especially where it is hot and the sun is shining, great quantities of water are evaporated and pass into the air as

invisible water vapour. The air rises and cools, and the water vapour condenses to form clouds. The clouds are blown on to land masses and the water falls to the earth as rain or snow. Much of the rain-water collects to form streams and rivers which carry the water back into the sea. There is, then, a movement of water in a circle, starting from the sea and finishing in the sea. We can call this the "Water cycle" or Hydrological Cycle.

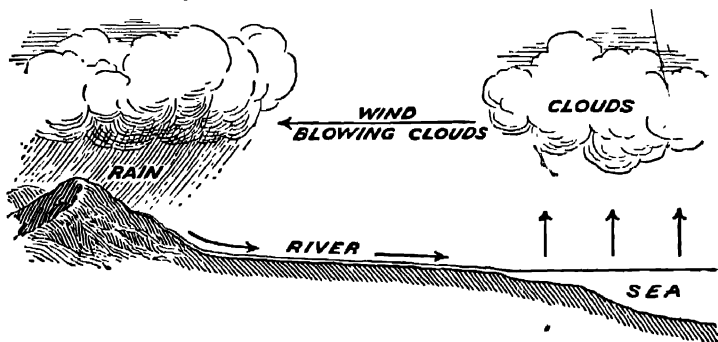


FIG. 48.—The water cycle.

THE WORLD OCEAN

The oceans occupy the deep hollows of the earth's crust. If we look at an atlas of the world, coloured to show the depth of the ocean, we notice that enormous stretches are between 2,000 and 3,000 fathoms in depth. The floor of the ocean is much more level than the surface of the land. There are many broad ridges where the ocean floor rises and the water is much shallower, but it is very rarely that we find steep-sided mountains or deep valleys on the ocean bed. That is because the denuding agents such as frost and running water which carve the earth's surface into mountain and valley are not at work on the ocean bed. We shall learn later, too, that a mantle of marine deposits is continually being spread over the ocean floor, and this helps to fill up hollows and irregularities. There are certain regions where the ocean is very deep indeed, and these regions are called "troughs" or "deeps." The most famous deeps include the Japan or

Tuscarora Deep (off Japan) and the Challenger Deep in the West Pacific. These are so deep (over 5,500 fathoms) that if the highest mountain in the world were placed in them it would still be covered by half a mile of water.

Look again at the same map and notice the fringe of shallow water up to about 100 fathoms, or 600 feet, in depth which surrounds the continents. This portion of the sea floor is called the *Continental Shelf*, and probably represents the former extent of the continents, the land having been worn away by the denuding action of the sea. Sometimes the continental shelf is broad, sometimes narrow. As a rule, when mountains occur near the ocean, the continental shelf is narrow and one passes rapidly from high land to deep water. From the edge of the continental shelf the level of the sea floor drops rapidly and the slope is called the continental slope. Study Fig. 49 carefully.

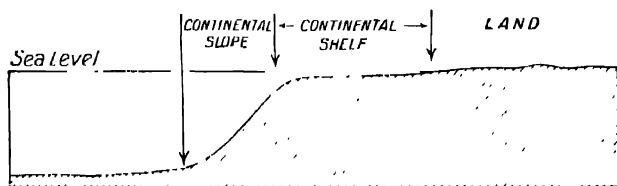


FIG. 49.—Section through a continental shelf.

The Oceans. All the oceans of the world are connected, and so in talking of them all we often use the term the "World Ocean," which covers 141,000,000 square miles out of the total earth's surface of 197,000,000 square miles.

Around the South Pole is the continent of *Antarctica*, surrounded entirely by a great stretch of water which is often called the **Southern Ocean**. From here the three most important oceans stretch northward—the Indian, Pacific, and Atlantic Oceans.

The Indian Ocean is smaller than the other two and is closed in on the north by the continent of Asia. On the west is the continent of Africa, and on the east the East Indies and Australia. The Indian Ocean is thus surrounded by continents and islands on three sides. Contrast this with the other two.

The Pacific Ocean is the largest. It is surrounded by a rim or girdle of high mountains, and close beneath these mountain chains are long narrow troughs. The remainder of the floor is fairly level but deep, and is remarkable for the large number of small islands. Some of the islands are rocky or mountainous but others are mainly composed of coral. The coral islands are probably built up on volcanoes which have broken through the floor of the ocean.

The Atlantic Ocean is much narrower and stretches right to the Arctic Ocean without any interruption. It separates the Americas on the west from Europe and Africa on the east. Although it is so much narrower there is, running down the centre, a long ridge covered by less than 2,000 fathoms of water. On either side there are deeper troughs. There are only a few islands in the Atlantic.

The Arctic Ocean surrounds the North Pole. Owing to the intense cold a great part is frozen over the whole year.

SALINITY

We all know that sea-water tastes salt. Indeed, it is so salt that it is quite impossible to drink it, and shipwrecked sailors have been known to die of thirst in the midst of the sea.

Sea-water contains on an average 35 parts of salt in 1,000 parts of water. If we remember the enormous quantity of water in the oceans, it is not difficult to realise the huge quantities of salt dissolved in it. We believe that the sea gets slightly saltier every year because the rivers, although we call their water fresh, bring down small quantities of salt. When sea-water evaporates to form water vapour the salt is left behind and rain-water is quite fresh. If we look again at Fig. 48 it will be clear that the rain-water falling on the surface and the rivers dissolve salts from the earth and that the salts are carried into the sea and left there.

Some parts of the ocean are saltier than others, or as we say, the salinity is higher. The salinity in seas and oceans ranges from over 40 parts per 1,000 in the Red Sea to about 30 in Polar seas. Near the mouths of rivers or in enclosed seas

receiving many rivers (like the Baltic) the salinity is very much less.

Distribution of Salinity. We shall learn later that near the Tropics of Cancer and Capricorn, that is, on either side of the equator, there are belts of deserts. In these belts there is little or no rain and little wind, and the temperature in the hot seasons of the year is very high. These deserts are continued into the ocean, where we find areas of very high salinity, more than 36 or 37; for instance the Red Sea. These are due to the great heat and evaporation, the lack of fresh water from rain and over large areas to the absence of currents. Along the equatorial belt also the evaporation is very great, but much fresh water falls as rain—and so this belt is not quite as salt. In this belt, too, many of the great rivers of fresh water, like the Amazon, Congo, and Niger, enter the ocean. From the Tropics of Cancer and Capricorn, as we go polewards, the water gradually gets less and less salt. Notice how some of the enclosed seas are very salt, others very fresh. The Red Sea is very salt because there are no large rivers entering into it, and the evaporation due to the sun's heat is very great. The Baltic and Black Seas are very fresh because large rivers enter into them, but the evaporation is small. Salt water is heavier than fresh water and so sinks, with the result that the surface layers of some seas are fresher than lower layers.

Salts of the Sea. Out of the normal 34 or 35 parts of salt per thousand, 27 parts consist of common salt or sodium chloride. But there are very many others. Sea-water is able to dissolve very, very small quantities of most substances. There is, for example, a very tiny proportion of gold in sea-water. The quantity is so small that it does not pay to obtain gold from the sea. Yet it is probable that about one thousand million *tons* of gold occur dissolved in the whole of the ocean waters in this way. An important salt dissolved in sea-water is calcium bicarbonate. This substance is drawn from the water by animals such as the coral organisms and the molluscs in order to build up their hard parts. To obtain the salt from the sea, we need only evaporate the sea-water—for example boiling the water in a basin or pan—and the

salt crystals are left behind. Much salt is obtained in some countries by allowing the sun to evaporate sea-water which has been led into shallow basins.

Then there are gases dissolved in sea-water. All animal life requires oxygen in order to live; those animals living on land obtain it from the air, but the inhabitants of the seas obtain it dissolved in sea-water. The plants of the sea—seaweeds—require carbon dioxide just as do the plants of the land, and they obtain it dissolved in sea-water. Nitrogen and other gases also occur in sea-water, but in a smaller proportion relative to oxygen than in the air.

TEMPERATURE

The temperature of the sea is much more uniform than that of the land. This is for two reasons:

1. Water is not heated so readily by the sun, but takes longer to cool.
2. The waters of the ocean are constantly moving and mixing.

The temperature is, however, by no means always the same. It varies in four ways:

- (1) The surface temperature varies from equator to the poles.
- (2) The surface temperature varies annually with the seasons.
- (3) The surface temperature varies daily.
- (4) The temperature of the seas and oceans varies with the depth.

(1) In the equatorial regions the surface temperature is more than 80° ; on the whole it gets steadily less and less until it is below freezing point in the polar seas. We must remember that the freezing point of salt water is lower than that of fresh water, and so the ocean around the poles has to be cooled below freezing point before it begins to freeze. The highest known temperature reached by the waters of the ocean is 96° F. (in the Persian Gulf). It has reached 94° in the Red Sea. The lowest recorded is 26° in the polar seas. Thus the extreme range is only 70 degrees compared with an extreme range for the air of about 200 degrees, and for the land still more.

(2) The ocean is naturally warmer in the hot season than in the cold. In equatorial regions, where the air is hot the whole year the surface of the ocean is hot the whole year too, and the seasonal range is less than 10° . In the polar regions the surface is very cold all the year, and again the range is less than 10° . It is in temperate regions that we find the greatest differences. Owing to the swing of the wind systems there are parts of the ocean near New York and in the Sea of Japan which in the cold season are under the influence of a cold current, but in the hot season are under the influence of a warm current. Here the annual range may be more than 50 degrees.

(3) Water becomes heated much more slowly than land, and also loses its heat more slowly. The brief space of one day's sunlight is not sufficient to heat the great mass of the ocean, and the daily range of temperature in all parts of the ocean rarely exceeds 1° .

(4) Warm water is lighter than cold, and so we find that the cold heavy water sinks to the bottom of the ocean and the warmer waters only form a very thin layer on the surface. Nearly all over the world the temperature of the water at the bottom of the oceans is about 34° . Look at Fig. 50 and notice how quickly the temperature decreases as we go downwards. Even near the equator it has dropped from 80° to 50° at a depth of 200 fathoms. In seas which are cut off from the open ocean the water is undisturbed by currents, and the temperature is nearly uniform except just at the surface.

In some respects water is quite different from nearly all other substances. When it is made very cold and freezes,

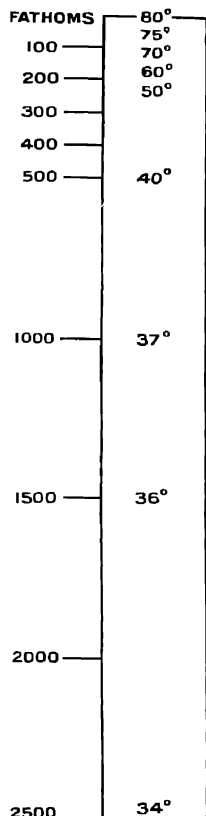


FIG. 50. — Section showing the temperature of sea water.

the solid water or ice occupies more space than the original water. That is, water *expands* in freezing and so the ice is lighter than water. We all know this, since ice floats on water. This is very fortunate; were it not so the ice might start forming at the bottom of the ocean and go on until the whole ocean waters froze except for a very thin layer at the top.

Sea Ice. Most of the great icebergs of the polar seas are derived from land ice, about which we shall learn in a later section. But over large areas the sea itself freezes in the cold season, but is free from ice in the warmer part of the year. At first little cakes of ice (called pancake ice) appear on the surface of the water. These gradually increase in size till they join up, and form a continuous sheet of ice (ice-field). This sheet, however, is later broken by waves and wind, and forms a thick jumble of blocks of ice which is called "pack-ice." The pack-ice gradually melts and disappears in the hot weather. Ice may also be formed growing out on the surface of the sea like a shelf from the land—this is called an ice-foot. Since fresh water freezes more readily than salt, the less saline seas, such as the Baltic, are liable to freeze at higher temperatures than where the water is very salt.

MOVEMENTS OF THE OCEAN

Waves. When the surface of the sea is disturbed, waves are produced. We can make small waves by dropping a stone into a pool of water. The waves move outwards from the spot where the stone fell. Although the waves travel outwards the water does not—it simply rises and falls. We can see this if a piece of wood or cork is floating on the water. It moves up and down when the waves pass, but it is not carried along. Waves are caused mainly by the wind striking on the surface of the water. It is only near the shores that the water actually moves forward. The bottom or trough of the wave is partly stopped by the sand and rocks of the bottom, the top or crest of the wave falls over and breaks as surf. Although in great storms the height of the waves may be as much as 50 feet, their effect is only felt near the surface. At a depth of 200 or 300 fathoms it is probable that the water is undisturbed by the

biggest storms. The height of a wave is the distance from the trough to the crest, the length is the distance from one crest to the next. In a later section we shall learn of the destructive action of waves on the land.

Currents. The movement of water from one part of the ocean to another gives rise to *currents*. The most important currents are the surface currents which are partly caused by the great wind systems of the globe. Careful observations on empty bottles thrown into the oceans, or on the drift of icebergs, etc., enable us to determine the directions of the principal currents and to make maps showing them. Currents also carry seed-pods, logs of wood, etc., from one country to another, and the coconut palm has spread to nearly all the small islands of the Pacific Ocean in this way. We also have bottom currents (or movements of water along the sea-floor) as well as currents downwards (due to the sinking of cooled water) and currents upwards due to the up-rise of warmer water. There are also local currents due to the tides or to differences in evaporation and salinity. The water in the equatorial regions becomes hot and tends to flow polewards as warm surface currents, while the colder water from the poles creeps along as bottom currents to take its place. The great evaporation in the hot regions causes bottom currents of cold water to flow in below and replace the loss.

Cold Currents and Warm Currents. When a current is flowing from a warm to a cold region it is naturally a warm current. When it flows from a cold to a warm region it is a cold current. Notice that the terms "warm" and "cold" are relative to the temperature of the neighbouring sea water and that a warm current may swing round and become a cold current.

The Currents of the Oceans. There is the same general arrangement of currents in the Atlantic, Pacific and South Indian Oceans. The northern part of the Indian Ocean is somewhat different, as it is enclosed by land and is affected by the South-West Monsoon during the rainy season. In the cool and hot seasons the currents are generally similar in their arrangement to those in the North Atlantic or Pacific Oceans.

The ocean currents are like the winds. They do not flow directly from north to south or from south to north, but are deflected according to Ferrel's Law by the rotation of the earth. Study Fig. 51 carefully.

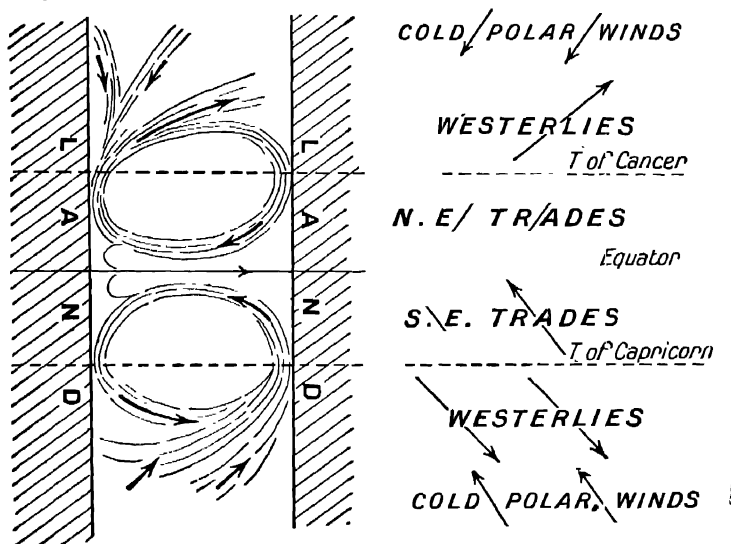


FIG. 51.—The general arrangement of currents and winds.

Notice in Fig. 40 the main wind systems and in Fig. 51 how the general arrangement of the ocean currents agrees with that of the winds. In the westerly wind belts we have currents from the west, in the belts of the Trade Winds they flow from the east.

North and south of the equator are the two Equatorial currents. Notice that they are both piling up water on the western sides of the oceans, hence there is an Equatorial Counter-current between them which brings part of the water back. Note which are the cold and which the warm currents.

The swirl of the waters is in the same direction as the winds in an anti-cyclone or "high." In the centre is an area of stagnant water often full of drifted seaweed (*Sargassum*) and often called the Sargasso Sea, though the true Sargasso Sea is the one in the North Atlantic.

Currents of the Atlantic Ocean. In Fig. 51 is shown the general arrangement of currents for all the oceans. Naturally their exact arrangement in each varies according to the shape of the land.

The cold waters from the Antarctic move under the influence of the westerly wind towards the east as the Antarctic or West Wind Drift, turn northwards along the shores of Africa as the cold Benguela Current, and then turn westwards under the influence of the South-East Trade Winds as the South Equatorial Current. This current divides near Cape S. Roque into a southern branch—the Brazil Current—but the main stream flows north-westwards just into the Gulf of Mexico. It emerges from the gulf as the famous Gulf Stream and is joined by the North Equatorial Current. At first the Gulf Stream is a rapid current of dark blue warm water. The average speed is three miles an hour or five miles in the coldest and warmest seasons, which is faster than the average speed of the lower Thames. The current spreads out and becomes the North Atlantic Drift, flowing right across the Atlantic and helping to warm the shores of the British Isles and north-western Europe generally. Part of the North Atlantic Drift turns southwards as the Canaries Current, which joins the North Equatorial Current. Between the two equatorial currents is the Counter Current. In the North Atlantic are two important cold currents: one, the Arctic Current, flows along the coast of Greenland; the other, more important, is the Labrador Current. The Labrador Current brings many icebergs from the cold polar regions. These icebergs are a great danger to shipping. Off Newfoundland the cold current comes in contact with the warm waters from the Gulf Stream with two results. First, great fogs are produced by the passage of the warm “Gulf Stream” air over the cold “Labrador” water. Secondly, the icebergs are rapidly melted and deposit their load of mud and stones on the Grand Bank off Newfoundland. From Newfoundland southwards the cold waters flow as the Cold Wall between America and the Gulf Stream, and the Cold Wall helps to keep the eastern coast waters of the United States comparatively cold. The cold

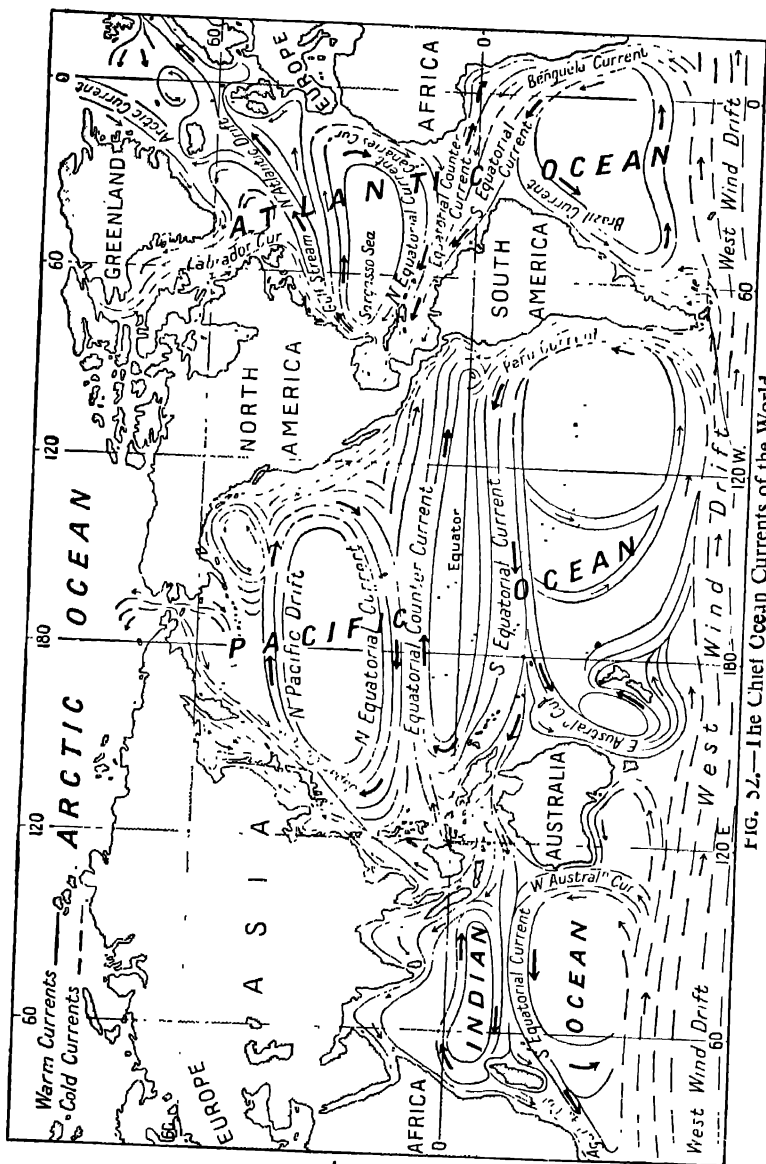


FIG. 52.—The Chief Ocean Currents of the World.

green waters of the Cold Wall can be easily distinguished from the deep blue waters of the Gulf Stream. The cold water is heavier than the warm, and so eventually sinks *under* the Gulf Stream.

Currents of the Pacific. Notice that the currents are almost exactly the same as in the Atlantic Ocean. The Peruvian or Humboldt Current takes the place of Benguela Current and is marked by the up-welling of cold bottom water to take the place of warm surface water driven westwards by the Trades or lost by evaporation. The East Australian or New South Wales Current replaces the Brazilian Current. The important warm Japan Current, or Kuro Siwo (Black Stream), is the equivalent of the Gulf Stream and passes into the North Pacific Drift which warms the coastal waters of western Canada. This current swings round into the Californian Current, which compares with the Canaries Current. In the north-west there is a cold current corresponding to the Labrador Current of the Atlantic.

Currents of the Indian Ocean. (a) *South Indian Ocean.* In the southern part of the Indian Ocean the currents are similar to those in the southern parts of the Atlantic and Pacific Oceans.

There is the same Antarctic Current, which swings northwards along the coast of Western Australia as the West Australian Current (W.A.) and passes into the South Equatorial. Like the South Equatorial Currents of the other oceans this divides, but the southern branch is split into two by the island of Madagascar. The most important branch flows between the island and the mainland as the Agulhas Current (A).

(b) *North Indian Ocean.* The currents in the northern part of the Indian Ocean depend on the monsoons. When the South-West Monsoon is blowing the drift of the water is from the south-west. At this time of the year—the Indian rainy season—the northern branch of the South Equatorial Current flows along the north-east of Africa as the Somali Current and then drifts across the ocean as the South-West Monsoon Drift. When the North-East Monsoon is blowing the water flows from the north-east and forms the North-East Monsoon

Drift, which is really the North Equatorial Current of the other oceans. At this season a counter-current flows eastwards between the two equatorial currents.

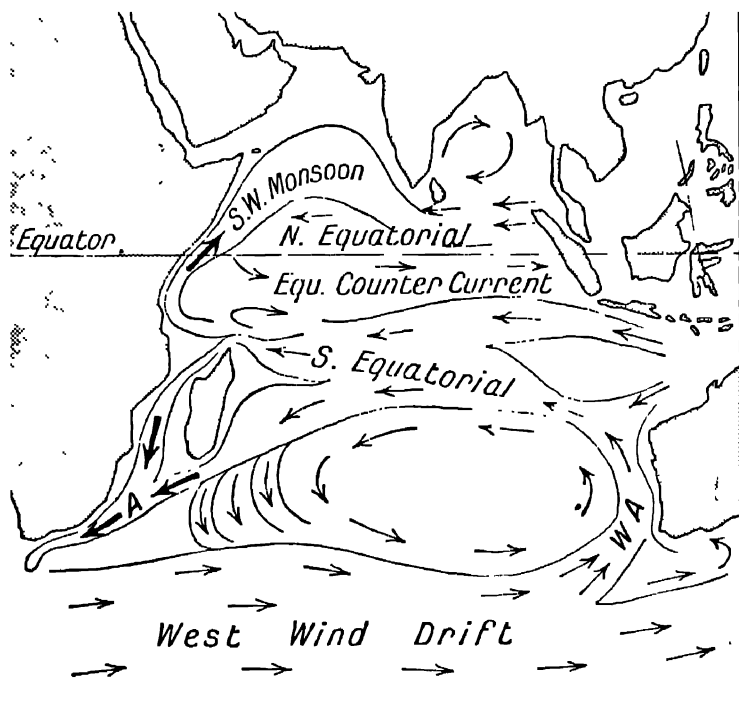


FIG. 53.—Currents of the Indian Ocean in the Indian Rainy Season.

Currents of Inland Seas. In some seas, especially the Baltic and Black Seas, the amount of fresh water received from rivers is greater than the loss due to evaporation. Consequently there are outward flowing currents of comparatively fresh water. Notice from the atlas the straits through which these currents flow.

Other seas, especially the Red Sea and Mediterranean Sea, receive only a little fresh water from rivers and the loss by evaporation is very great. The Red Sea is one of the hottest

seas in the world, and has no important river flowing into it. Consequently there are strong currents flowing in from the open ocean to replace the losses.

Strong local currents are caused by tides. We shall learn about these later.

Vertical currents are caused mainly by the uprise of water to replace losses due to evaporation. There is thus a constant "welling up" of water in the equatorial regions.

In some seas which are cut off from the ocean by a ridge and in which there is little evaporation, the bottom waters are stagnant—that is, they do not move. This is the case in the Black Sea. This prevents air or dissolved gases from circulating, and so animals are prevented from living in such stagnant waters.

Effect of Currents on Climate. The air over a warm current is kept warm, and the air over a cold current is cold. Consequently lands which are under the influence of a warm current have a much milder climate than places in the same latitude which are bathed by a cold current. This is not because the warm *water* warms the land but because the warm *air* from over the water blows over the land. Look at Fig. 52, and from the Atlas find the position of Labrador, Vancouver, and the Island of Sakhalin. The sea round the British Isles is never frozen because of the warm North Atlantic Drift, but the coast of Labrador on the same latitude is ice-bound for three-quarters of the year. Vancouver is always free from ice, but Sakhalin is surrounded by ice for a great part of the year. Why is this? New York (latitude 40°) has much colder winters than London, although London (latitude 51°) is much farther north. Indeed, the waters of New York harbour in winter are as cold as those of the North Cape in Norway (latitude 71°).

Where cold and warm currents meet, dense fogs are common, as for example, off the Grand Bank of Newfoundland, where the cold Labrador Current meets the warm waters of the Gulf Stream. The icebergs floated along by the cold currents help to keep the air cold. As the icebergs are often hidden by the fogs, the danger to ships is very great. The *Titanic*,

then one of the largest ships in the world, was lost on her maiden voyage in 1912 through collision with an iceberg hidden by fog. It was only during the Second World War that the development of radar enabled ships to see through fog and so to detect icebergs.

Violent storms are caused by differences of temperature and may follow along the line of meeting of cold and warm currents. The hurricanes which occur off the coast of the United States follow the line where the Gulf Stream and the Cold Wall meet. The typhoons of the Pacific sometimes follow the course of the Japan Current.

TIDES

Those who live near the coast or near an estuary know that the surface of the sea rises and falls twice a day. This motion of rising and falling is called the tide. We have all heard of the force called *gravitation*. All bodies exert the force of gravity or gravitation and tend to draw all other bodies towards themselves. When we look at the school globe, we sometimes wonder why people "on the other side" do not fall off. It is because the force of gravitation is all the time drawing them towards the centre of the earth. It does not matter in what country we live, if we climb a tree and slip we shall always fall towards the centre of the earth. In the same way the waters of the oceans are held on to the earth by the force of gravity. But there are other bodies besides the earth which are trying to draw all things towards themselves. The most important are the moon and the sun. It is the moon (and to a less extent the sun) trying to draw the waters of the ocean towards itself which causes the tides. The moon's pull at any place will be greatest when the moon is directly over that place, *i.e.* when it is on the meridian. Have you ever watched a horse pull a heavy cart which is standing still, or an engine drawing a heavy train trying to start? There is a hard pull and a time lag before the cart or the train begins to move, but once it begins to move it is not such hard work. In the same way the moon has to pull hard before the water begins to move, and

so high tide—the result of the moon's pull—occurs a little time *after* the moon is on the meridian.

It used to be thought that this was the only, or at least the principal, cause of the *tides*. But we now know there is another very important cause. When a body is rotating on its axis, loose objects tend to fly away from the surface. In other words, a “centrifugal force” is set up by the rotation of the earth. But the moon is, at the same time, revolving round the earth, and so the real cause of the tide may be said to be the centrifugal force set up by the rotation of the earth and moon round their common centre, which is not the same

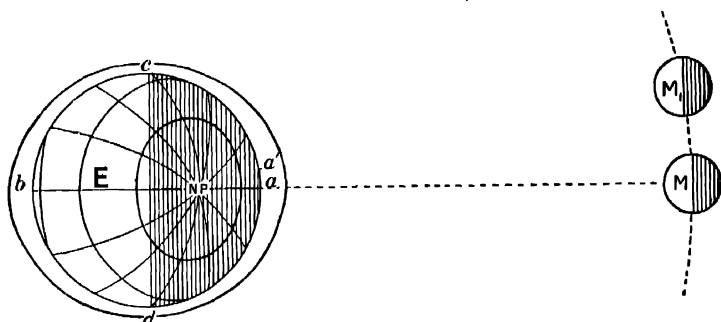


FIG. 54.—Diagram to show the cause of tides.

as the centre of the earth. The moon rises about three-quarters of an hour later every day, and so the high tide on one day is about three-quarters of an hour later than the corresponding tide on the day before. As there are usually two tides per day, each tide is just over twenty minutes later than the one before.

The sun also helps to cause tides. When it is pulling in the same direction, *i.e.* in the same straight line as the moon, we get very big tides (spring tides); when it is pulling in opposition, *i.e.* at right angles, to the moon, we get only small ones (neap tides).

Fig. 54 shows diagrammatically what *might* happen if there were no land masses on the surface of the earth, but only a continuous ocean of uniform depth. There would be high tide on one side of the earth at *a*, and as the moon moved round

the earth the position of high tide would move to a' . At the same time there would be low tide at c and d . Actually the position is quite different, because the great land masses or continents divide the world ocean into a number of ocean basins largely cut off from one another. We all know what happens when we try to carry a shallow basin nearly full of water. In the centre it remains almost steady, but it tends to "slop up and down" round the sides—first to one side and then to the other. That is roughly what happens in each of the oceans. In the open ocean the water is comparatively steady and rises or falls only a few inches or at the most a foot or so. But on the margins of the oceans and especially where there is a shallow continental shelf round the continents the effect of the tide is much greater.

The tides are very important in estuaries and harbours. The water when rising, or as we say the "flood-tide," rushes up into the estuaries forming a strong tidal current. When this current is flowing it is impossible to feel the effect of the fresh water flowing down the estuaries to the sea. The water when falling, or the "ebb-tide," rushes out of the estuary or harbour, often at a great rate, forming a strong tidal current flowing this time towards the sea. These tidal currents are very important to places like Liverpool and London, which are on tidal estuaries. The water is much deeper at high tide and very large vessels can go far up the estuary, and they are partly carried up by the strong tidal current. Even big steamers often wait for the tide to carry them up or down the estuary. The strong tidal current helps, too, to keep harbours and estuaries free from mud and rubbish, which are swept out to sea by the ebb-tide. In funnel-shaped estuaries the tidal currents may be so strong as to be very dangerous. The water rushes up as a wall of water called a "bore." There is a strong bore on the Hooghly River at Calcutta.

A similar current rushing through a narrow channel causes a *race*, and when the channel is irregular may cause dangerous whirlpools. Some whirlpools are so dangerous that if small ships are caught in them they are almost certain to be wrecked.

LIFE IN THE OCEAN

At a depth of 500 fathoms in the ocean it is completely dark, for sunlight does not reach to a greater depth than that. All ordinary plants and most animals require light in order to live. So we find nearly all life in the ocean exists within 500 fathoms from the surface. In the deep parts of the ocean there is very little life except for a few strange creatures, some of which are luminous and so provide their own light. There are two main groups of animals and plants in the ocean:

- (a) Those which swim or float about in the surface waters and are found in all parts of the oceans and seas;
- (b) Those which live on the bottom and are mostly found on the continental shelves or in shallow seas.

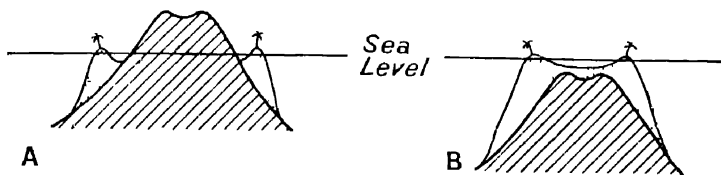


FIG. 55.—Sections through two types of coral island: (A) a mountainous island with a fringing reef; (B) an atoll.

Inhabiting the seas are immense numbers of very, very tiny animals and plants—so small that we cannot see them with our unaided eyes. These minute animals and plants are called “plankton.” It is they which form the food of fishes and larger animals. The great fishing grounds of the world are found on the continental shelves, where the bottom is suitable for the fish to lay their eggs, and where there is plenty of plankton food for them. Important animals living on the bottom are the molluscs, some of which are used for human food. They are nearly all found in shallow water near the land and include edible oysters and pearl oysters.

The coral builders are important because they build up coral reefs and islands in tropical waters.

The coral builders, molluscs, and many of the plankton form their hard parts—that is, their houses or their shells—

of calcium carbonate which they obtain from the water. When the animals die the hard parts remain and collect together on the bottom of the ocean, and so form different deposits on the ocean floor.

MARINE DEPOSITS

Covering the floor of the seas and oceans there is a thick coat of *marine deposits* which is continually being added to. Near the shore are sands, gravels, and muds formed by the wearing of the land, and among the sand and mud are buried the hard shells of molluscs and the bones of fishes. In deeper water we find red, blue, and green muds, or sometimes coral mud formed of tiny broken fragments of coral. In the deep parts of the oceans far from land the deposits are formed entirely of the minute shells of the plankton. Such deposits are called *oozes*. There are different kinds of oozes according to the different plankton of whose shells they are formed. Two of the most important are the white Globigerina ooze and darker Radiolarian ooze. In the very deepest parts of the ocean we find a *Red Clay*.

LAKES

Lakes are areas of water surrounded by land. Usually they have a river flowing in at one end and flowing out at the other, and such lakes are fresh—that is, their water is not salt. Sometimes, however, there is no outward flowing river, but evaporation prevents the lake from growing larger. When water evaporates, any salts it has in solution are left behind. So we find lakes of this sort are usually salt. Some of them, like the Dead Sea and Great Salt Lake, are much saltier than the ocean, and may be so salt that animals cannot live in them. Some lakes in desert regions, like the centre of Australia and the dry parts of South Africa, dry up in the dry season and completely disappear or leave only a small marshy area. Many lakes are much bigger in the rainy season than in the dry season, like Lake Eyre in Australia.

D. THE LITHOSPHERE

THE Lithosphere is the name which we give to the solid crust of the earth. The materials of which it is composed are called *rocks*, whether they be hard or soft. Geology is the name of the science which deals with the crust of the earth, but it is necessary for us in geography to know something about its nature and composition. We have learnt that the hydrosphere is the mantle of water which girdles the earth, but the lithosphere projects through it and forms the continents. It is almost impossible to study that part of the lithosphere which is hidden below the ocean; we can only study that part which forms the dry land.

CHANGES IN THE EARTH'S CRUST

It is most important to realise that changes are continually taking place on the surface of the earth. The changes which are going on continually but gradually are of three main kinds:

- (a) The wearing away of the land, which we call *denudation*.
The wearing away which takes place in the air is called weathering.
- (b) The removal of material from one part of the earth's crust to another, which we call *transportation*.
- (c) The laying down of this material in fresh places, which we call *deposition*.

There are also more sudden or discontinuous changes such earthquakes, volcanic eruptions, etc.

DENUDATION OR EROSION

As soon as dry land appears above the surface of the ocean there are forces waiting to wear it away. This is very apparent after a heavy rainstorm. The rain beats down on the ground and removes loose particles of soil, so that after a storm one

may often see that tiny valleys have been cut at the sides of the roads. Most of the larger streams and rivers of the British Isles, especially after a period of heavy rains, are very muddy. That mud has been brought by the river from far away and is being carried out to sea, where it will all be deposited. The rain and rivers are not the only agents of denudation, there are others. Thus the chief agents to be considered are (1) the



[Photo: L. D. Stamp

FIG. 56.—The weathering of granite, largely due to the action of the sun. Matopo Hills, Southern Rhodesia.

sun, (2) wind, (3) rain, (4) frost, (5) running water, (6) moving ice, and (7) the sea.

Action of the Sun. In hot countries the heat of the sun is very great during the day, and the rocks on the surface are made very hot. We know that when most things are made hot they expand or grow larger, but some substances expand more than others. The rocks of the earth's crust consist of different substances called *minerals*, and the minerals expand at different rates. One mineral expanding more quickly than

the others causes the rock to burst so that cracks are formed. Then at night time the rocks get very cold and contract. When this process is repeated day after day the cracks increase in size and gradually the rock breaks up into small pieces.



[Photo: L. D. Stamp

FIG. 57.—An earth pillar in the dry belt of Burma.

This action of the sun is called *insolation*, and is important in *hot dry countries*.

Wind. The wind acts in two ways. Strong wind blows loose particles of soil and dust away. The wind is often strong enough to blow quite coarse sand from the sea-shore for long distances inland. In some countries the wind blows all the soil away so that no plants can grow. There is another way,

too, in which wind wears away the land. When strong wind armed with millions of sharp pieces of sand blows against a cliff or mass of hard rock, it gradually polishes the surface and then commences to eat away the hard rock. The action is strongest near the ground, so that a rock is "undercut" and eventually it falls over. The action of the wind is particularly important in dry countries and near sea-shores.

Rain. The rain, especially in hot countries like parts of Africa where there is a very heavy rainfall, has a powerful action in loosening and carrying away the soil. When the soil is bound together by the roots of trees or grasses this is more difficult, but when the trees are cut down and the hillsides are cultivated, large areas are often completely washed away by a heavy fall of rain. When heavy rain falls on soft beds of sand or clay in which there are big stones, the soft material all round the stone is washed away, but the soft rock which is below a big stone is protected and so stands up as an earth pillar. Fig. 57 is a picture of an earth pillar from the dry part of Burma. Rain, too, in passing through the air, absorbs a considerable proportion of carbon dioxide gas. Rain-water with this gas in solution is able to dissolve certain hard rocks such as limestone. Much of the rain-water sinks into the ground and carries on its work of solution there, forming underground caves. There are a few substances, too, like salt, which are dissolved by pure water.

Frost. The action of frost is important in cold countries. When the rain falls, part of it sinks into the ground and fills up the cracks in the rocks. At night, when it becomes very cold, the water in the crack freezes. Now when water is changed into ice it expands, so that the force of the water in the crack expanding when it is changed into ice causes the crack to widen. This goes on night after night till the crack becomes very wide, and one day when the ice melts a lump of rock breaks off. The blocks and stones thus produced by frost action are angular and sharp edged. Frost is one of the most powerful agents in cutting away the tops of high mountains. It causes them to be very rugged and sharp edged. The angular blocks fall to the foot of the mountain and form heaps called scree.

Running Water. When rain falls on the ground some of it sinks in, but a great part of it collects together to form little streams, which in their turn join up to form rivers. The streams cut for themselves little valleys, which at first tend to be deep and narrow. The rain helps to wash away the banks so that the valley becomes broader and broader with age. The force of the water itself is sufficient to do a great deal of damage, especially after a heavy storm when the stream is in flood, but it is enormously increased by the load of stones and sand which the water collects. Big pieces of rock are hurled against one another and gradually worn into rounded pebbles and

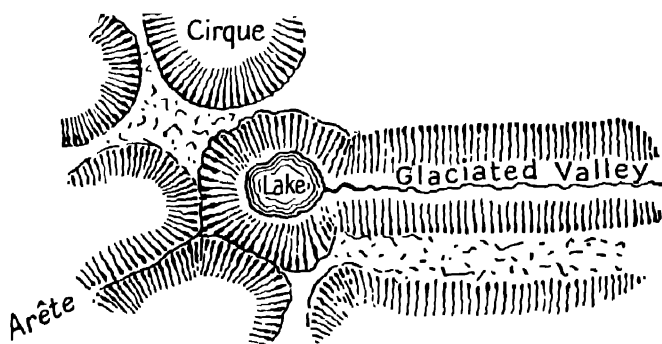


FIG. 58.—A glaciated valley (see page 94) with a corrie lake at its head. A corrie or cirque is a depression at the head of the valley where formerly the snow and ice accumulated to form the glacier (see page 104).

sand. The stones, too, are thrown against the hard rocks in the bed and on either side of the stream, and as a result the stream is able to cut its valley even through solid masses of hard rock. Denudation by rivers and moving water takes place in all parts of the world except the very coldest. The denuding action of a river is greatest in its upper course, where the water is flowing down steep slopes. Big slow rivers like the Thames or Rhine have little power to wear away the land. Rivers, like rain-water, may dissolve certain rocks such as limestone as well as wear them away mechanically.

Moving Ice. In very cold countries, and in high mountainous districts where it is equally cold, we find solid masses of ice

instead of rivers. These "rivers of ice" are called glaciers. Like rivers, they occupy valleys. Compared with rivers, glaciers move only very slowly, but they do move. Fresh snow is falling on the mountains behind them and by its weight helps to push the glacier down its sloping valley. The snow itself is compressed as "névé" or "firn" and then gradually into ice and so added to the glacier. The mass of ice moving downwards gradually scoops out its valley. Blocks, cut off the surrounding mountains by frost, fall on the surface of the glacier. Great cracks called crevasses form in the mass of ice, and into these cracks some blocks fall and are frozen into the bottom of the glacier. There they come in contact with the hard rocks of the valley floor, and the two scratch one another. We must notice that a glacier is able to scoop out its floor, so that one part of its valley may be deeper than

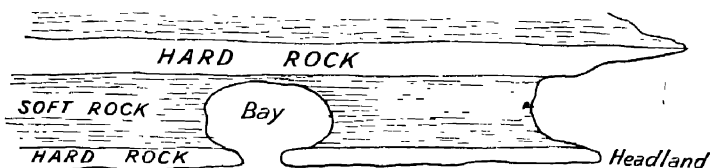


FIG. 59.—Map of a sea-shore with headlands of hard rock.

another. A river cannot do this. The result is that when the glacier melts lakes may be left.

Some very cold countries such as Greenland are almost completely covered by a great *ice-sheet*. Formerly, similar ice-sheets covered much of Europe, including the greater part of the British Isles, and North America, and have left behind many evidences of their one-time existence.

The Sea. The sea is a powerful agent in wearing away the land, especially in time of storm. Each wave hurls a great mass of water against the shore and washes away the soft parts; usually, too, the waves are armed with small stones and sand which are hurled together with the water against the shore and do still more damage. Naturally, the sea cuts away the soft rocks more rapidly than the hard. The harder parts are left as headlands, capes, and islands. Not only does the sea

break away large pieces of rock from the coast, but it pounds the pieces against one another till they are worn into pebbles and sand. The action of the sea does not extend to a great depth, and the area of land which has been worn away is marked roughly by the extent of the *continental shelf*. We must notice that the other agents of denudation cut the surface into hills and valleys, but the sea wears them away until a nearly *flat* surface is formed.

TRANSPORTATION

Some of the same agents which are capable of wearing away the land are also able to carry the material from one place to another.

Wind. The wind blows fine dust for great distances. The interior of China is covered by a thick-mantle of fine dust (called loess), which has been blown to its present position by the wind. Wind also blows sand from the sea-shore for great distances inland. Dust-storms are common in dry country and in deserts sand is constantly moved by the wind. In dry farming country the wind sometimes causes great damage by blowing away the soil (wind erosion).

Running Water. Rivers are the most important of all transporters of material. Some of them are many thousands of miles long, and so carry mud and sand for enormous distances. Rivers carry material in two ways:

(a) In suspension, that is, suspended in the water itself.

If one takes some water out of one of our English rivers when in flood it is very muddy. If the water is left for some time without moving it, the mud will settle to the bottom. Fine particles such as mud, silt and sand transported in this way are said to be carried in suspension.

(b) Along the bed of the river, quite large stones can be moved great distances by being rolled along the bed, but as they are rolled along they are knocked against one another and gradually made smaller.

Moving Ice. Glaciers also carry material in two ways. Mud, stones, and big boulders are frozen into the bottom of

the glacier, and mark the surface over which they are carried with long scratches. We have also the large and small blocks which fall on to the surface of a glacier from the sides of the valley. At first most of them are carried near the edges of the surface of the glacier (lateral moraines), but if two glaciers join, the two lateral moraines unite to form a central or *medial moraine*. In cold countries the glaciers descend right to the sea-level, and the foot of the glacier is pushed out into the sea. Great masses of ice are broken off and float away as icebergs, carrying their load of moraine with them. We should notice that icebergs originating in Antarctic seas are large, blue in colour, and flat topped; those from Arctic waters are more irregular.

The Sea. The sea carries material in two directions. It rolls pebbles and sand laterally along the coast. It also gradually moves the material which it has broken away from the coast into deeper and deeper water. Much of the material brought down by rivers is washed farther away when it reaches the sea.

DEPOSITION

There comes a time when all the material which has been worn away from one part of the earth and carried to another is laid down again or deposited.

Wind deposits. The lands in dry countries—such as parts of China and the interior of Asia—are often covered by a thick mantle of wind-borne dust called loess. The sand blown from sea-shores and in deserts is deposited as crescent-shaped sand-dunes. The sand-dunes found on many parts of the coast of Cornwall (England) are good examples.

River Deposits. Where a swiftly flowing mountain stream suddenly enters a flat area it often drops a great heap of mud and stones, forming an *alluvial fan*. Where a river enters on a flatter portion of its valley and the current becomes slower, the river drops much of the sand it is carrying and so forms sand-banks. Much more important are the deposits formed where the river enters the sea. Here even the fine mud is dropped, and the salt in the sea-water has the effect of making the river drop nearly all its load. The deposits formed at the mouth of a

river form a broad flat area, intersected by channels of the river itself and called a delta. Look in an atlas for maps showing the deltas of the Ganges, Nile, Amazon, Mississippi, and other big rivers. The mud which is dropped by a river is called alluvium. More and more alluvium is deposited until the channel of the river itself may be entirely filled up, and the water has to find a new channel in another direction. Thus the channels in a delta are continually changing. The stretches of alluvium then form land, and indeed some of the most fertile land in the world has been formed in this way. Notice the enormous areas covered by the deltas of many rivers. This shows the great amount of mud which is brought down by rivers. Some rivers do not form deltas at their mouths, because the mud is swept away by the currents of the sea or by tides.

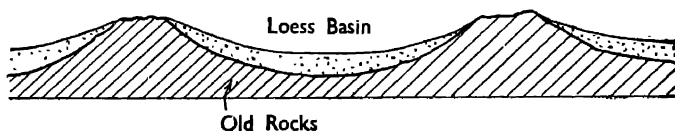


FIG. 60.—Section through a loess-filled basin, e.g. North China.

Thus most of the British rivers have no deltas because of the strong tides round the coasts.

Many rivers, too, overflow their banks every year and deposit a thin layer of the fertile mud or alluvium over the flat floor of their valley. A good example is the valley of the River Nile in Egypt, which has been made fertile in this way. The area so flooded is called the flood-plain. Old flood-plains border many English rivers, but now the water is prevented from spreading over the land, and the plains form rich meadows or arable land. A river may cut down to lower levels and parts of its old flood-plains may be left as *terraces*.

Lake Deposits. When a river enters a lake, mud and sand are dropped until gradually the lake is filled up. Thus lakes act rather like filters and the outflowing stream is often of clean fresh water. Lake Geneva is a good example.

Glacial Deposits. When a glacier from the mountains descends to lower levels where the air is warmer, the ice melts

and the moraines are deposited. At the melting end of a glacier we find an irregular mass of mud, small stones, and big boulders, which is called a *terminal moraine*. Sometimes when a glacier melts some of the lateral moraine is left perched on the sides of the valley in curious positions. We call such blocks "perched blocks" (Fig. 68). The moraines carried by icebergs are eventually dropped on the floor of the ocean. There

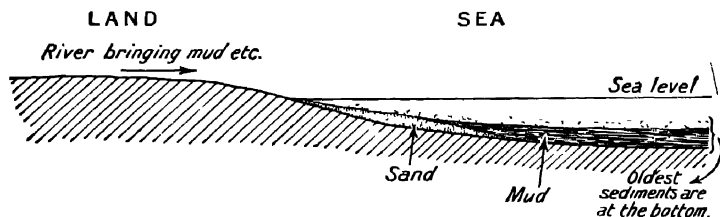


FIG. 61.—Diagram to illustrate the formation of sedimentary rocks.

are certain places where the cold currents bearing the icebergs come in contact with a warm current and the icebergs quickly melt, so that great quantities of moraine are dropped. Such a place is found off the coast of Newfoundland and is called the "Grand Bank."

The great sheets of ice which covered so much of Europe and North America during the Great Ice Age when they melted

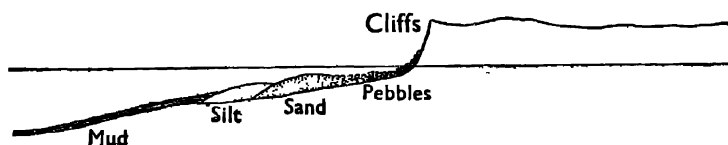


FIG. 62.—Marine deposits associated with a shore line with cliffs.

left behind irregular masses of clay full of big stones, called boulder clay, as well as gravels and sands.

Sea Deposits or Marine Deposits. Near the shore we find coarse deposits of sand and pebbles (littoral deposits); in deeper water the deposits are mainly fine sand and mud.

Organic Deposits. Besides mud, sand, and stones which are dropped on the floor of seas, lakes, and rivers, we find

deposits which are formed of the remains of animals and plants. In some parts of the world forests are found growing in very wet flat land, and when the trees die they fall into the stagnant shallow water and other trees grow up on top of the dead ones. In time the remains of the trees are converted into peat, and later into brown coal or lignite and coal. Peat is thus an organic deposit formed from the remains of plants. Most of the peat now being formed in wet regions consists not of the remains of trees but of small plants called mosses. Peat mosses are common in Siberia, Ireland, and many other temperate countries. Organic deposits may also be formed from the remains of animals living in the ocean, as we have already learnt.



FIG. 63.—Section through young valleys (A) and an old valley (B).

THE WORK OF RIVERS

It will be seen that the work of rivers is threefold:

- (1) In the swift upper or mountain course the main work is denudation or wearing away.
- (2) In the slower middle or plains course the main work is transportation.
- (3) In the slow lower or deltaic course the main work is deposition.

We must now consider some of the characters of river valleys. When the valley is first formed it is often deep and narrow, but with time the sides are worn away by the action of rain, side streams or tributaries, and the action of the river itself, so that gradually the valley becomes broad and open, as shown in Fig. 63. In countries where there is little rain the valley may remain very narrow and deep, as in the famous Colorado Canyon. In the steep upper course the water finds its way
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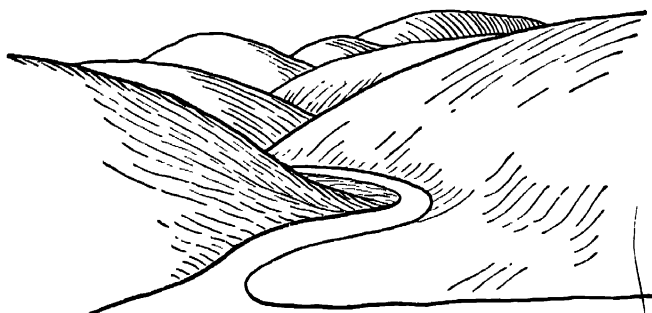


FIG. 64.—Diagram of a valley with interlocking spurs.

by the easiest or nearest way to the lower land, but in the middle part of its course the river swings from side to side across its valley floor. River valleys are rarely straight, and if



[Photo: Central Aerophoto Co.]

FIG. 65.—A river meandering across a peneplain.

we look up a valley we notice that hills stick out from either side, so that we cannot follow the course of the river itself far with our eyes. Such a valley with small hills jutting out on either side is called a "valley with interlocking spurs." The

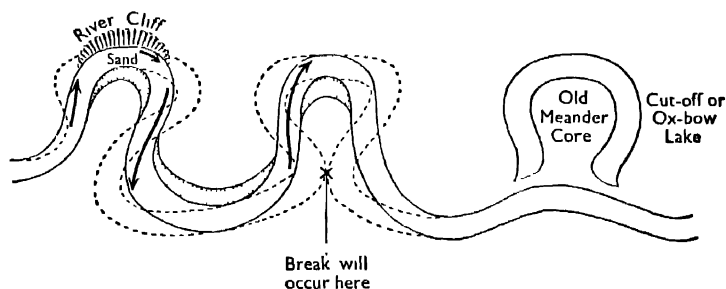


FIG. 66.—Diagram of a meandering river with sandbanks.
In the centre of the ox bow lake is the old "meander core."

small hills or spurs appear to interlock because they are first on one side and then on the other. As time goes on the river cuts away the spurs on either side, and we find a broad open

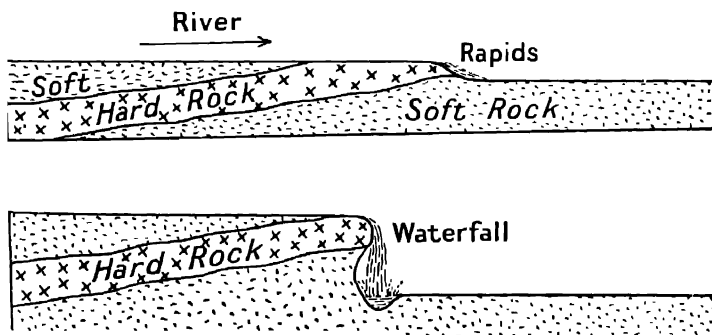


FIG. 67.—Sections showing the origin of a waterfall.
Notice the "plunge-pool" at the foot of the waterfall

valley with the river wandering about from side to side. The bends of the river are called meanders. Sometimes a bend in the form of a horseshoe is formed and then the river cuts a new channel. The old channel may be left as an area of stagnant

water or a lake. Rivers which flow over broad alluvial plains, like the Ganges, are continually changing their course. Rivers like this, too, deposit sandbanks in one place and cut a deep channel in another place. Notice from Fig. 66 how they do this. In the next flood season, during the rains, the river cuts away the sandbanks it formed the year before and makes a new channel. The Ganges does this, and maps which were made a few years ago are not correct now. We shall learn later that there are both hard or resistant and soft or "weak" rocks. A river is able to cut away soft rocks more easily than hard, and when a band of hard rock is reached waterfalls and rapids may be formed as shown in the diagrams. Niagara Falls originated in this way, but not the Victoria Falls.

River Basin. The whole of an area drained by a river and its branches or tributaries is called the river basin. Two basins are usually separated by a ridge or hills which form the water-parting or watershed. Some rivers drain into lakes with no outlet and not into the sea at all, and their basins are called basins of inland drainage.

THE WORK OF GLACIERS

Glaciers have a threefold work like rivers, but ice does not swing from side to side like water, and so glacial valleys are

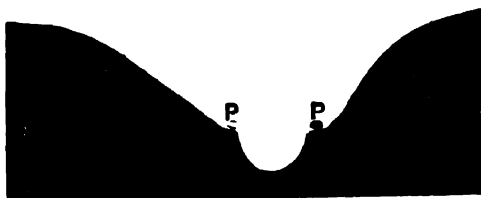


FIG. 68.—Section through a glacial valley. P=position in which perched blocks are left.

generally straight and without spurs as shown in Fig. 58. We must note that the valley occupied by a glacier is U-shaped, that occupied by a river V-shaped.

UNDERGROUND WATER

Some of the rain which falls upon the ground sinks into the rocks beneath. The amount which sinks in depends upon the nature of the rock. Some rocks allow water to pass through

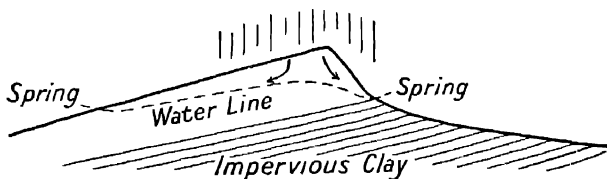


FIG. 69.—Diagram showing the origin of springs.

them very easily—they are full of small cracks or holes—and are called permeable. Other rocks like clay will not allow water to pass through them, and are called impermeable or impervious. We can, for instance, make a cup or vessel of clay and it will hold water. Let us see what happens when the rain-water sinks underground and meets an impermeable rock. It will then travel along the surface of the latter and find its way out on a hill-side as a spring. Such a spring often forms the source of a river. See what happens when the rocks are bent into a hollow curve, or a “syncline.” The water is trapped in the centre, and by putting a well in the centre we get a good supply of water. Such a well is called an artesian well if the

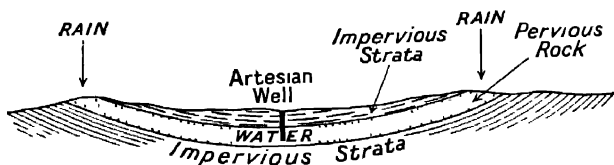


FIG. 70.—Section showing an artesian basin.

water gushes out at the surface. There is a small artesian basin under London, and in the Murray basin and many other parts of Australia there are vast artesian areas tapped by numerous wells and bores.

Where there is limestone, as in Derbyshire or the Cheddar

district of Somerset, the underground water is able to dissolve some of the limestone, and so caves are formed. Limestone caves are also remarkable for stalactites and stalagmites. As the water trickles through the roof some of it evaporates and a little of the limestone it has dissolved is deposited, and in time masses hanging from the roof are formed—these are called stalactites. A similar deposit found on the floor forms the stalagmite.

SUDDEN CHANGES IN THE EARTH'S CRUST

Before we can understand the sudden changes—earthquakes and volcanic eruptions—which take place, we must go back and learn a little more about the structure of the earth. We learnt that the interior is probably a solid mass of iron. Outside this is the lithosphere. We must remember that we can only see and study the upper part of the lithosphere. We know, however, that as we go down in the earth's crust from the surface—as when we descend a mine—it gradually becomes

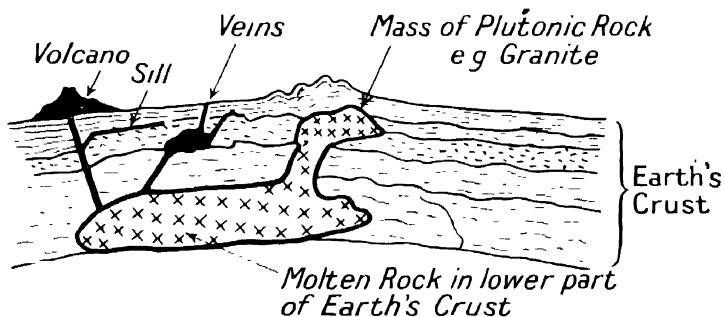


FIG. 71.—Diagrammatic section through part of the earth's crust.

hotter. At great depths it must become so hot that the rocks if they could would be molten. For the most part, however, the rocks must be kept solid because of the great pressure. So we can picture the solid earth's crust on which we stand as a thin shell below which are rocks very, very hot indeed. But the shell is not equally strong all over. As we shall learn later, there are weak places or even cracks. We

have just learnt that material is shifted from one part of the crust to another, and the removal may leave one part of the



[Photo : L. D. Stamp.]

FIG. 72.—A typical extinct volcano, Mt. Hood, U.S.A.

Notice the conical form, with the upper part of the slope steeper than the lower. This volcano is about 11,000 feet high and is entirely built up of lava and ashes. It has not been active for many years.

crust weaker than others. When the crust gets weak the pressure is less, and so underground where it is very hot the rocks become molten and begin to move. The movement of

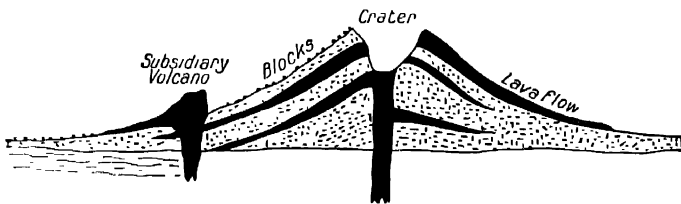
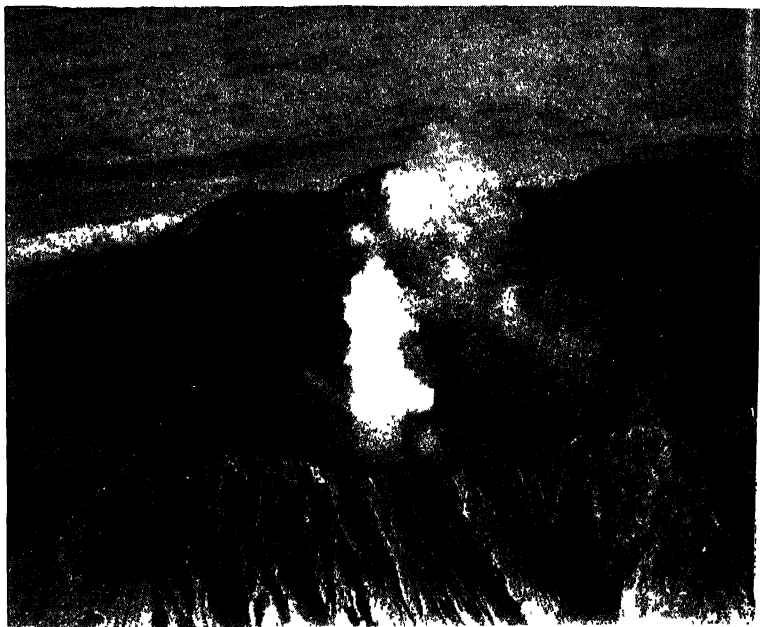


FIG. 73.—Diagrammatic section through a volcano, Mount Popa, Burma.

molten rock underground causes the solid crust to shake, and this causes earthquakes. Sometimes the molten rock finds its way to the surface and is poured out as a volcano. When the molten rock first bursts through, it often does so with

great violence. Great clouds of steam are emitted, and dust and ashes are thrown far into the air. The ashes fall back to earth and build up a mountain near the opening. The molten rock or lava which is poured out adds to the mountain already formed. The cup-shaped hollow in the centre of a volcano is called the crater; the neck is the passage through



[Photo : Courtesy of Netherlands Indies Information Bureau]

FIG. 74.—Looking down the crater of an active volcano, Mount Bromo, Java. The cloud of steam and gases rises day and night with a loud roaring noise.

which the molten rock comes. The lava may be poured out as several volcanoes, or it may come out along huge cracks. Many hills in the Midland Valley of Scotland consist of lava which has been poured out from volcanoes. Volcanoes which are no longer active are called extinct. The Castle Rock, Edinburgh, is part of an extinct volcano. A volcano which is only sleeping and may become active is called dormant.

Volcanoes are arranged along lines of weakness in the earth's crust. One such line runs right round the Pacific Ocean; another, rather less important, runs from Iceland, just touching the British Isles, through the Azores and Cape Verde Islands, across to the West Indies, with a branch running through the Mediterranean Sea.

Because of the great heat in the lower layers of the earth's crust, springs of water from a great depth may be very hot. In volcanic districts, or districts where there were formerly volcanoes, geysers may occur. Geysers are hot springs which throw up quantities of boiling water into the air at intervals of so many minutes or hours. They are found in Iceland, New Zealand, and Yellowstone National Park, United States.

Earthquakes. The movement of molten rock deep down in the earth's crust causes the surface to shake, and we, living on the surface, feel an "earthquake." Some earthquakes are connected with volcanic eruptions, but much more important are the earthquakes which result from the movement of material underground—a movement which we cannot see. Like volcanoes, earthquakes usually occur along weak places in the earth's crust. Some of them are actually connected with cracks in the crust. These cracks are called "faults," and often after an earthquake the rocks on one side of the fault are seen to have moved up and on the other side to have moved down, leaving a small cliff. After the great San Francisco earthquake in 1906 it was impossible to travel along some of the roads because there was a sudden drop of 6 or 10 feet where the road had been cut by a fault.

Results of Earthquakes. A particularly serious earthquake occurred in Japan in September, 1923. After that terrible disaster it was found that some parts of the surface had moved up so that areas of land appeared which were before covered by the sea, but other places which were formerly dry land sank below the level of the sea. In such cases huge waves may be formed and sweep over the land, causing great loss of life.

With a succession of earth-movements the changes produced

may be very great indeed. We see that there are four principal results of earthquakes.

- (1) The surface of the earth is folded; some parts move up and others move down producing arches and hollows in the rocks of the crust. The arches are called "anticlines" and the hollows "synclines."
- (2) Along cracks or faults the rocks are moved up on one side and down on the other or sometimes sideways.

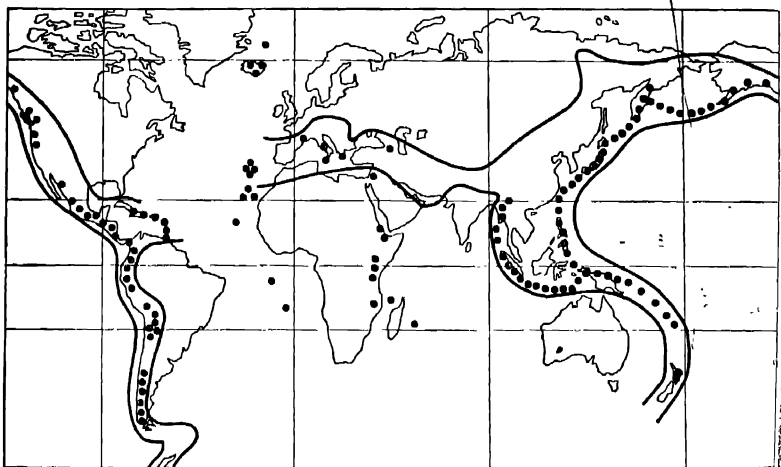


FIG. 75.—Map of the world, showing the distribution of active and dormant, or recently extinct, volcanoes (marked by dots)

- (3) Large areas may be lifted up above sea-level so that they become dry land; other areas of dry land become covered by the sea.
- (4) In some parts of the world large blocks of country have been rent by great cracks crossing one another roughly at right angles. Along these cracks the rocks are shattered and more easily removed by the agents of denudation such as rivers and glaciers. Deep, steep-sided valleys with sudden right-angled bends are produced which, when they sink below sea-level, become the well-known fiords such as are found on the coasts of Norway and south-western New Zealand.

MOUNTAIN BUILDING

The two most important kinds of mountains are fold mountains and block mountains. Both kinds are produced by a long series of earthquakes. Let us see how.

Fold Mountains. As a result of one series of earthquakes a level stretch of the earth is gently folded like this:



FIG. 76.

The next series of earthquakes may make the folds much greater so that they become like this:



FIG. 77.

Notice how, as soon as the rocks are folded up above the general level, the agents of denudation start to wear them away.

Later the rocks are still more folded like this:



FIG. 78.

One part is ridged up to form mountains often of great height, while the other part is covered by the waters of the ocean. Mountains formed in this way are by far the most important in the world—the Himalayas, Alps, Andes, Rockies, etc. They usually form long lines or ranges of mountains, such as the great chain which runs through the continent of

America from north to south. Of course it takes a long time and a great many earthquakes for such a great mountain chain to grow. The mountains of Wales and many of those of Scotland are folded mountains of ancient rocks.

Block Mountains and Rift Valleys. We learnt above about faults or cracks. Sometimes a big mass of land is pushed up between several cracks and so forms a mountain which we call a block mountain.

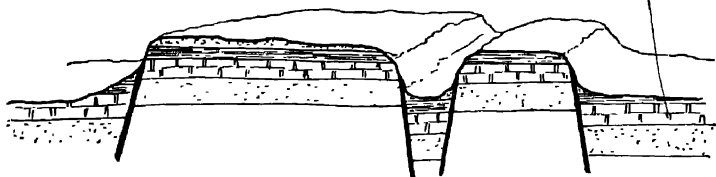


FIG. 79.—Diagram of block mountains and rift valleys.

Sometimes a long narrow piece of the crust is let down between two parallel cracks and forms what is called a rift valley. A good example is the whole great Midland Valley or Central Lowlands of Scotland.

Mountains of Accumulation. There are other kinds of mountains besides fold and block mountains. Volcanoes are often called “Mountains of Accumulation,” because they are formed by the accumulation of material which is thrown out on to the surface and so gradually built up into hills. The newest example of such a mountain is Paricutin in Mexico. It only began to “accumulate” in 1944; four years later it was 2000 feet high.

Mountains of Denudation. We have learnt how the agents of denudation gradually wear away the surface of the land. As soon as block mountains or fold mountains are formed they begin to get worn away. Sometimes only a small piece of the original mountains may be left, all the rest being worn away. Such a fragment left behind is called a mountain of denudation. The Peak, Derbyshire, is a good example.

Slow Movements of Elevation and Depression. A single earthquake may produce a considerable change, and several

earthquakes may result in great changes although no mountains are formed. We find that in many parts of the world the land is steadily rising or sinking. In many parts of the world beds of sea-shells are found high above sea-level, *e.g.* in the "raised beaches" round the English coasts; in other parts the remains of forests are found covered by the sea. This shows that the land relative to the level of the sea is rising in some parts and sinking in others.

Peneplains and Plateaus. We learnt that the sea is the most important agent which wears away a flat surface (the surface of the continental shelf). If part of this surface becomes raised into dry land, it forms a peneplain. The word "peneplain" means "almost a plain." A peneplain may also be formed by rivers. We learnt that when a river becomes old it swings from side to side, and gradually the valley sides are worn away and almost disappear. The ridge between one valley and the next can scarcely be seen, and the whole surface of the land is almost a plain—a peneplain, sometimes spelt peneplane.

The movements of elevation may cause a large area to be raised a considerable height above sea-level. Such a big flat-topped stretch of high land is called a plateau. We must remember that as soon as a stretch of dry land is formed, the sun, rain, frost, running water, and ice commence to wear it away. If the rocks are soft they will be worn away quickly, but if they are hard they are removed only slowly. But eventually the plateau will be worn into a series of mountains and valleys. Only the tops of the mountains remain approximately on a level to remind us that there was once a plateau. Such a region is called a "dissected plateau," and Peninsular India is an example.

THE FORMATION OF LAKES

Lakes may originate in many ways.

(a) A river valley may be blocked by a fall of rock or a lava-flow.

(b) The lower end of a river valley may be raised up by an earthquake. Many of the lakes in the Alps were formed in this way.

(c) An arm of the sea may be cut off to form a salt lake. The Caspian Sea has been formed in this way.

(d) Sand-dunes thrown up by the sea may "impound" river water coming down from the hills. The shallow lakes Alexandrina, Albert, and the Coorong at the mouth of the Murray in Australia have been formed thus.

(e) Parts of a deserted river-bed may form lakes. The cut-off "ox-bow" lakes are very common and represent old meanders or curves of the river which it has deserted.

(f) Small lakes may occupy the craters of extinct volcanoes.

(g) Many lakes occupy hollows scooped out by glaciers or by the great ice-sheets which once covered many parts of the globe. The lakes of Canada and Northern Russia are examples. Sometimes a valley has been blocked by glacial moraine, as in some of the Scottish lochs. Small, almost circular lakes are often found at the upper ends of valleys formerly occupied by glaciers. They are often surrounded by steep walls of rock and the valleys are called cirques, cwms or corries (see Fig. 58).

(h) Some important lakes occupy rift valleys, e.g. Lake Tanganyika.

ROCKS

We learnt that the materials making up the crust of the earth are called rocks. We can classify them into four main groups according to the way in which they have been formed.

(a) **Sedimentary or Stratified Rocks** are those which have been laid down in beds or layers (strata) by wind, running water, or the sea. They are in many ways the most important. Animals or plants may sometimes be buried and their hard parts may remain. When afterwards the sediments are raised by earth-movements into dry land we may find sea-shells, etc., far inland. We call such remains "fossils." We can divide sedimentary rocks into three very rough subdivisions:

(i) Alluvium, which is still being formed by rivers.

(ii) Young soft rocks which have not been subjected to great earthquakes or mountain-building movements. It is in such rocks that oil is found. Examples are clay, shale and sand.

- (iii) Old hard rocks which have been bent, folded, and cracked by many earthquakes and often raised into high mountains. Even amongst the soft rocks we usually find hard bands which give rise to waterfalls, etc. Sandstone is an example.

(b) **Organic Rocks** are rocks formed of the remains of animals or plants (organisms). Coal is an organic rock which is formed from the remains of forests which have been submerged and then buried. Mineral oil has also been formed from the remains of animals or plants buried when a river deposited its load of mud in the sea or a lake. The important point for us to remember in geography is that coal and oil are *always* found in sedimentary rocks. If we come to a country where the rocks are *not* sedimentary, it is quite useless to look for coal. Many limestones are organic rocks because they are built up of the hard parts of animals living in the sea which have extracted the calcium bicarbonate from the sea water and built up their own shells from the calcium carbonate obtained in this way. Coral is an example.

(c) **Igneous Rocks**, which means literally “fiery rocks,” are those resulting from the interior heat of the earth. There are two main kinds:

- (i) Those which reach the surface in volcanoes and are called *volcanic rocks*. Large areas of rock in Antrim, north-east Ireland, and in the Snake River area of the north-western United States have originated in this way. A common example is basalt.
- (ii) Those which moved underground but became solid before they reached the surface. We should never be able to see these rocks if it were not for denudation, which gradually wears away the rocks above and enables us to see the “deep-seated” or plutonic rocks below. A good example of these rocks is granite. Such rocks are usually hard and resist weathering as seen in such granite masses as Dartmoor or Shap Fell, Cumberland in England or the Coast Range of British Columbia.

(d) **Metamorphic Rocks** are literally rocks which have

“changed their forms.” We have learnt that earthquakes bend and fold the earth’s crust and gradually build up great mountains. In the process the rocks are hardened and changed. Other rocks become buried by the fresh layers piled on top of them, and may be altered by the great heat in the lower part of the earth’s crust. We know that if we take a piece of clay and bake it, the brick which results is quite different from the clay: this is an excellent example of how heat may alter rocks. Deep in the earth the rocks may be altered far more, and it is almost impossible to tell what the original rock was like. We call such rocks metamorphic or crystalline rocks. It takes a long, long time for rocks to become changed like this, and some of the areas of crystalline rocks were formed ages

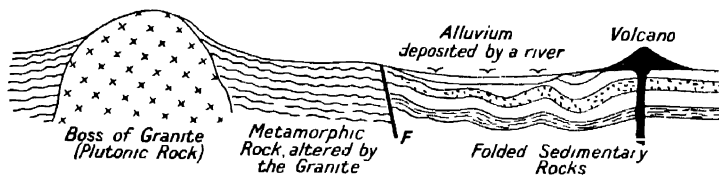


FIG. 80.—Diagrammatic section through part of the earth’s crust showing different kinds of rocks.

ago and have remained unchanged ever since. The Central Highlands of Scotland form a good example, whilst the Canadian Shield is one of the largest areas of such rocks in the world. Metamorphic rocks, like igneous rocks, are usually hard and so resist weathering. Gneiss, schist and slate are examples.

Ores and Precious Stones. Nearly all the ores of the valuable metals originate like igneous rocks in the hot lower layers of the crust. The ores are dissolved in molten rock or very hot waters and find their way up to the surface through cracks. They may be deposited in the cracks, thus forming “mineral veins.” Other ores and precious stones are formed when rocks are metamorphosed or changed. Thus we look for precious stones and ores of metals such as gold, silver, copper, lead, zinc, and tin in areas of crystalline or igneous rocks, or sometimes among the old hard rocks of the sedimentary group. Some ores are very hard and heavy, and when washed out (

The parent rocks by rain and rivers are often collected together as rich patches in the beds of streams and rivers. Such deposits are called "alluvial deposits"; tin ore and gold are often found thus.

Notice that we shall always look for the ores of metals in quite different country from that yielding coal and oil.



[Photo—Courtesy of Netherlands Indies Information Bureau.]

FIG. 81.— The weathering of soft rocks.

This mountain is an extinct volcano in Java. It is built up of soft ashes and the heavy rains are now cutting deep channels down the side of the mountain.

Connection between Relief, Rocks and Mineral Products.

Areas of lowland will usually consist of alluvium or of young soft rocks, and so we shall expect oil and coal to be the principal mineral products of such regions.

Areas of highland or mountains will usually consist of old hard rocks or igneous or metamorphic rocks, and so we shall expect ores, minerals and precious stones to be the principal products.

E. THE MAJOR GEOGRAPHICAL REGIONS

THE most important thing of all for us to understand in geography is what we usually call "Geographical Control" or, better, Geographical Influence, because man is strongly influenced rather than absolutely controlled by geographical conditions. We must always remember that geography is not just a description of the countries of the world. That is only a small part of geography, and not the part we should learn first. When people began to study their own and other countries they were content at first just to find out facts. But soon they wanted to know "why" and "how" everything should be as it is. They soon found out that there were a few basic *causes* which were to be found all over the world and which control its development.

If we live in one of the world's flat areas such as the English Fenland, we know that we have to go many miles before we see a big hill. Most of the country around is almost flat, and there are many cultivated fields. Yet there are other parts of England and Wales with almost the same climate (same temperature, same rainfall), but with very few cultivated fields because there is very little flat land where crops can be grown. That is an example of the *control of physical features*—where the land is flat there are many arable fields, where the country is mountainous there are few. But there are many dry parts of the world where there is plenty of flat land, yet there are few cultivated fields. That is very often because it is too dry; the rainfall is not sufficient for growing crops. Here we have an example of the *control of climate*. Again, we wear much more clothing, especially in winter, than people do who live in tropical climates. This is again climatic control. But these are not the only cases of geographical control. You can take almost any fact in geography and you will find it has reasons. Many

people live in London. Why has London become such a great city? There is its position, its great port—here we have the control of physical features again. We shall learn later of the other reasons, some geographical but others also very important, for the growth of London.

Or, again, many of you will be looking forward to August and September, for then you have your long school vacation. Perhaps you have never thought about it, but that is an example of climatic control. It is partly because it is very difficult to work well at school during the hot weather, so the holidays have been fixed for the hottest part of the year. In the Southern Hemisphere, as in Australia, where the hottest months are December and January, the long vacation is in that part of the year.

These examples will help us to understand what is meant by “geographical control,” and how important it is. There are really *three* enormously important factors—position or geographical location on the earth’s surface, physical features and climate. In many countries the physical features almost make the climate. We shall learn later, for example, how the physical features of Australia control its climates. But the next important thing is for us to learn how the control acts. First, physical features and climate together control the distribution of *vegetation*. We do not have wheat fields on the sides of rugged mountains, and we cannot have forests where there is no rainfall. We shall learn in the next chapter that each type of climate has its own type of vegetation. Then in order the vegetation controls the *animal-life*. We do not find camels in the wheat fields or fruit orchards of Great Britain, and we cannot feed sheep on forest trees. Each type of vegetation has its own characteristic animals. Then we come to man. Man is really influenced by all these factors—physical features, climate, vegetation, and animal-life. But man can think and work and is able to overcome some of the natural control. But he can only do so after much thought or labour or expense. Where a sea town has no natural harbour he can build an artificial one; where a country is too dry to grow crops—like the valley of the Nile in Egypt—he can bring water and irrigate

the land; he can move plants from one part of the world to another, cultivate them, and improve them; he can take animals and domesticate them and train them to do his work.

We cannot deal in detail with this subject here, but we may note in particular (a) man's control of climate—*e.g.* the way in which in the tropics he adapts food, clothing and shelter to meet heat; (b) man's effect on the land and water surface as well as on plants and animals. By quarrying, mining and building he has been described as the greatest agent of denudation in such countries as the British Isles.

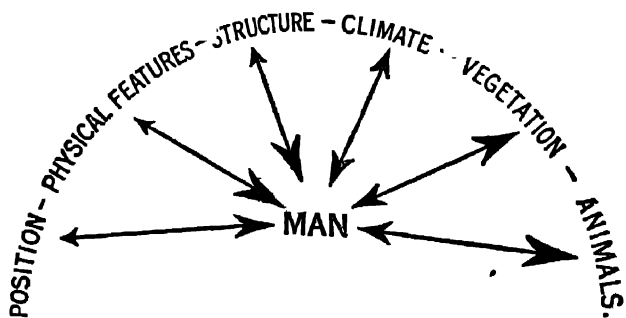


FIG. 82.—Diagram showing geographical influence.

The arrows show both the influence of the geographical factors on man and his power to alter these factors in turn

But although man can thus alter some of the effects of nature, he is, in the main, controlled by his “geographical environment”—that is, by the conditions under which he lives. It is only in certain ways that man is able to fight against nature. We are now going to learn something more about the details of geographical influence, and shall take first climate.

THE PRINCIPAL CLIMATES OF THE WORLD

There are only twelve major types of climate in the whole world, and we must study these very carefully and remember the essential features of each. So clear is the connection between vegetation and climate that it is often simpler to name the climate after its characteristic vegetation.

1. *Equatorial or Hot, Wet Climate.*
2. *Tropical or Sudan Type of Climate*
3. *Monsoon or Summer Rain Climate.*
4. *Hot Desert or Sahara Type of Climate.*
5. *Mid-Latitude Desert or Iran Type of Climate.*
6. *Mediterranean or Winter Rain Climate.*
7. *Warm Temperate East Coast Types of Climate.*
8. *Cool Temperate Oceanic or Rain at all Seasons Climate.*
9. *Mid-Latitude Continental or Grassland Climate.*
10. *Cold Forest Climate.*
11. *Arctic or Cold Desert Climate.*
12. *Alpine Climate.*

Climates of Low Latitudes
or the Tropical Zone.

Climates of Mid
Latitudes or
the Temperate
Zone.*

1. The Equatorial Climate, or Climate of the Hot, Wet Evergreen Forests. This type is found as a belt stretching about 5° on each side of the equator. The temperature is high all the year round but does not vary very much; the average for the whole year is about 80° . Rain falls nearly all the year, so that the air is always hot and moist and the climate as a whole oppressive. The rains are mainly convectional. Owing to the great heat there is much evaporation. The water vapour rises to the upper part of the atmosphere and is cooled and so falls as rain. Very often evaporation takes place during the morning and the rain falls in the afternoon, accompanied by thunder. Though rain falls throughout the year there are often two seasons rainier than the rest of the year. The Amazon and Congo basins are typical areas having this climate. Islands near the equator—the East and West Indies—have a similar climate, and so has the Malay Peninsula and New Guinea. Parts of Ceylon and the Guinea coast in Africa have a climate which is very nearly of this type.

2. The Tropical Climate, or Climate of the Savana or Tropical Grassland. This climate is found on either side of the equatorial belt, and is well developed in Africa. As usual, "rain follows the sun," and so the heaviest rainfall occurs soon after the sun has been shining vertically, whilst the dry season occurs in the colder part of the year. This type of climate is found in the Sudan (Africa), and so is often called the Sudan

* They occur in the "Temperate Zone" but are often climates of great extremes.

type. The Orinoco Basin and the Brazilian Highlands in South America have this climate.

3. The Monsoon Climate. The Monsoon Climate is very similar to the Tropical Climate, but the rainfall is caused in a different way. This climate occurs around the Indian Ocean, especially in India, Burma, North-Western Australia, and Abyssinia in Africa. There are small regions in north-western South America which have a monsoon rainfall. It is characterized by three seasons. There is the cool season with little rain, lasting in India and Burma from about November to February; then the temperature begins to get higher, and there is the hot season from March to June. The rains break in June and last till October. Nearly all rain falls in the last-mentioned period. If these are the seasons in a monsoon area of the Northern Hemisphere, how would they differ in the Southern Hemisphere? Another name for the Monsoon Climate is the Summer Rains Climate, for the rain falls in the summer of the year. The summer would otherwise be very hot indeed, but the rains make it cooler.

4-5. The Climates of the Great Deserts. Passing from the region of the Tropical or Monsoon Climates towards the poles we find regions which are very hot and dry—so dry that scarcely any plants can grow. These regions lie mainly in the high-pressure belts just outside the Tropics. The Trade Winds blow away from them towards the equator, the Westerly Winds blow away from them towards the poles, and there are no winds which bring rain into the regions. Some of the regions are dry too, because, like the centre of Asia, they are very, very far from the sea. There is very little rain and few clouds, so that the sun's rays strike down fiercely on to the ground and make the days very hot indeed. The highest temperatures in the world are found in these regions. But after sundown the ground loses its heat very quickly, and so the nights may be cool. We may divide these deserts into two groups:

(a) The Hot Deserts, occupying lowlands along the Tropics of Cancer and Capricorn. Examples are the Sahara Desert, the Desert of Arabia, and the Great Indian Desert. In the

Southern Hemisphere there are deserts in Australia, South Africa (Kalahari), and South America (Atacama).

(b) The Mid-Latitude Deserts, usually found on plateaus outside the Tropics. They are much colder in the cold season, and may be covered with snow. Examples are the deserts of Iran or Persia, the deserts of Gobi or Shamo, and Colorado in North America.

6. **Mediterranean Climate.** As the sun moves north and south of the equator during the year, so the main wind belts of the world swing with it. There are parts of the earth between

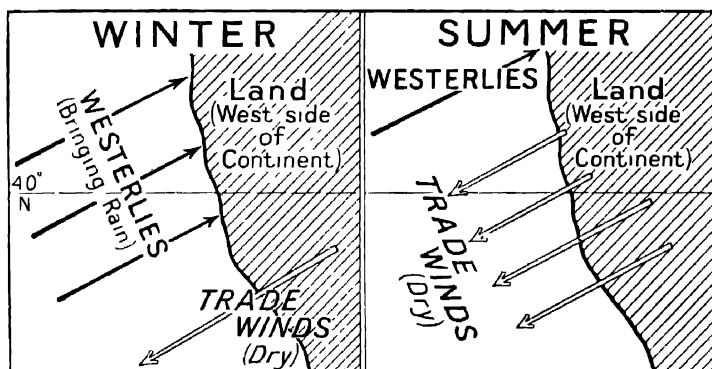


FIG. 83.—A diagram showing the cause of the Mediterranean Climate.

latitudes 30° and 45° which in summer are in the northern part of the Trade Wind Belt, and so are hot and dry like the deserts which join them on the side nearer the equator. In winter, however, these regions come under the belt of westerly winds, and so enjoy moist, mild weather. In other words, this is the Winter Rain Climate. Contrast it with the Monsoon or Summer Rain Climate, but remember that the Monsoon Climate is, on the whole, a much hotter one. The Mediterranean Climate is so called because it is found all round the Mediterranean Sea, but it is also found on the western sides of North and South America, South Africa, and south Australia (*i.e.* around Perth, Adelaide and Melbourne).

7. **Warm Temperate East Coast Climates.** The Mediterranean

Climate is found in regions on the western sides of the continents, but on the eastern sides, just outside the Tropics, there are sometimes regions having a warm, moist summer and a cool, sometimes dry, winter. You will see this is very like the Monsoon Climate, but the temperature throughout the year is less as the regions lie outside the Tropics. China and eastern Australia, south-eastern United States of America and the coastal regions of Natal are examples, but there is a very

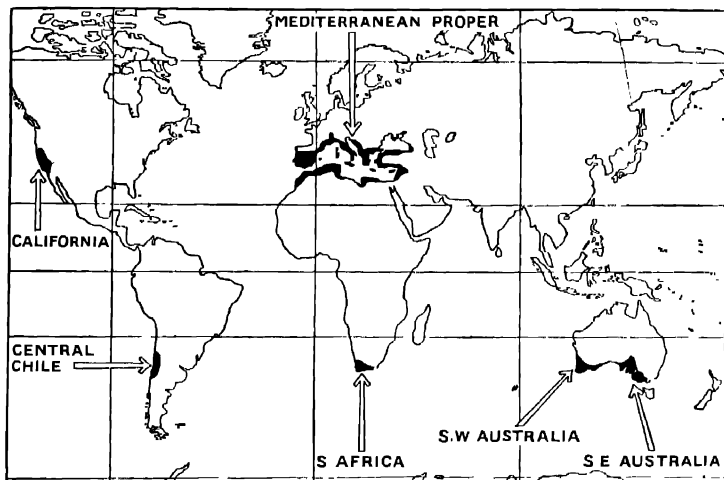


FIG. 84.—Map of the world, showing the Mediterranean regions.

considerable difference between China, with very cold winters, and the other regions.

8. Cool Temperate Oceanic Climate. We learnt that the Mediterranean regions feel the effect of the rain-bearing westerly winds during the winter. We come next to those regions which are in the Westerly wind belt during the whole year. They have rain all the year round but, compared with rain in tropical regions, it is usually less. The winters are mild, and the summers cool. This is the climate of north-western Europe (including the British Isles), western Canada, southern Chile, Tasmania, and New Zealand. On the east of the

continents (eastern Canada, New England and Manchuria) the winters are much colder.

9. Mid-Latitude Continental or Grassland Climate. Regions having this climate lie mostly in the same belts as the last—in the westerly wind region—but they are far from the ocean and do not feel the moderating effects of its presence. Consequently the summers are very hot and the winters are very cold—a typical “Continental Climate.” Rain falls mostly in spring and early summer, but it is not heavy. It comes mainly as light showers. In winter there is a light snowfall. We shall learn later of the great and very important grassland regions of the world where this climate occurs—the prairies of North America, the steppes of south Russia and south Siberia. Although this type of climate, sometimes called the Riverina type, is found in Australia, South America (pampas), and South Africa, the extremes of temperature are much less than in the heart of Asia or North America, and snow is rare.

10. Cold Temperate Climate, or Climate of the Coniferous Forests. The Cool Temperate Oceanic Climate passes gradually into a colder climate where much of the moisture falls as snow and not as rain. This is the region of the coniferous forests, and occurs as a great belt across North America, northern Europe, and northern Asia.

11. Arctic or Cold Desert Climate. Here the winters are very long and very cold, and there is only a very short, sharp summer. This climate occurs mainly inside the Arctic and Antarctic circles.

12. Alpine Climate. The effect of climbing up a mountain is very like going a great distance towards the poles. The climate changes as we ascend and gets colder and colder. Near the tops of high mountains it is very cold and there is perpetual snow above the “snow-line.” But the climate just below the snow-line is not quite the same as in Arctic or Antarctic lands, because on the mountain-tops the air is very thin. So we have a special name for the climate found on high mountains—the “Alpine Climate,” named after the great mountain chain of Europe, the Alps.

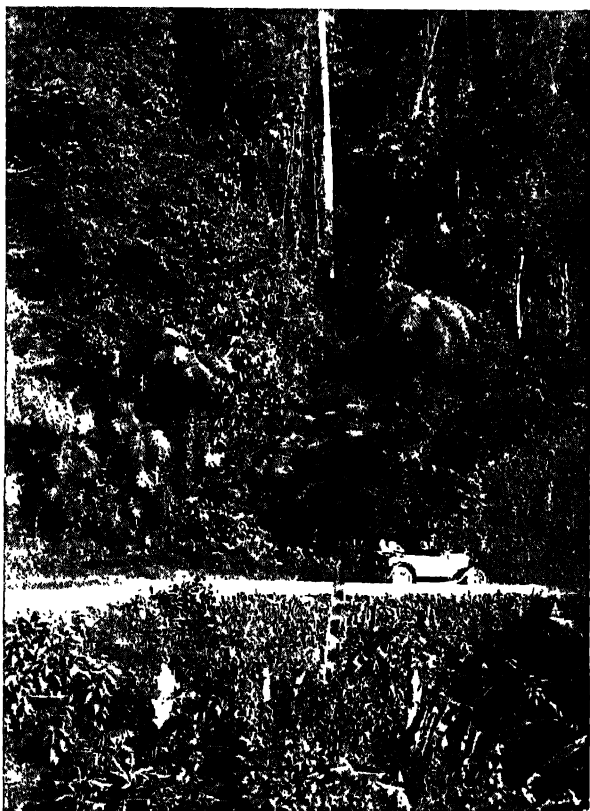
THE VEGETATION BELTS OF THE WORLD AND THEIR INHABITANTS

For each type of climate there is a characteristic vegetation, and the two in their turn influence the animal-life, man and his activities. We will take the vegetation belts in the same order as the climates.

1. **The Evergreen Equatorial Forests, or Selvas (Hot, Wet Forests).** In the belt of equatorial rains and even in monsoon lands where the rainfall is more than 80 inches in a year, the air and soil are always damp. The moisture and heat cause the growth of luxuriant trees, often of great size. All plants need light and air, and amid the dense, rank growth of the equatorial forest there is a constant struggle upwards to reach the light. The big trees grow tall and straight, with a crown of leaves at the top. Other plants reach the light by climbing up the trees—these are the lianas or woody climbers—and often grow to such a size as to kill the tree by which they climbed up. Other plants grow high up on the branches of the trees and reach the light that way. Thus the branches may be thickly clothed with ferns. In the tallest and densest equatorial forests the mass of leaves is so thick that no sunlight ever reaches the ground, and it is dark and gloomy. This is the case with many of the forests of the Amazon and Congo Basins. Other forests are not quite so thick, and a little sunlight may reach the ground. The forests of much of the East Indies are like that, and there we find a rich growth of smaller plants (which we call undergrowth) on the ground. The trees of the equatorial forests are of very many different kinds, but nearly all of them have very hard wood. Much of the wood is very fine—like mahogany and ebony—but it is very difficult and expensive to cut down these great hardwooded trees. Even the more easily reached evergreen forests are scarcely touched yet.

The equatorial forests are the home of the rubber trees, and rubber collecting is still an important industry in the Amazon forests of South America. But the most and best rubber is now obtained from plantations which man has

made—on the fringes of the equatorial belt in Ceylon, Malaya, East Indies, and Lower Burma. Another useful tree is the cinchona, whose bark yields the medicine quinine. The



[Photo: L. D. Stamp.]

FIG. 85.—A road through an equatorial rain forest (South America). Notice the many climbers with woody stems; these are very abundant in equatorial forests. Many of the trees are 200 feet high.

cocoa or cacao tree belongs to these regions too, and also the manioc plant. Near the sea, on sandy shores, we find the coconut palm almost everywhere. Its big seeds, the coconuts, float and are carried by ocean currents, so that the palm is

found on nearly all tropical islands. In Africa the Guinea oil palm takes the place of the coconut palm.

Animals, like trees, must have light and air and so we find most of the inhabitants of the equatorial forests are adapted for climbing. The monkeys are typical. In the denser forests nearly all the animal-life is to be found in the treetops. There we find all sorts of animals specially adapted for climbing—tree-frogs and tree-lizards as well as birds, and a wealth of insect-life.



FIG. 86.—The evergreen forests of the world.

How is man to live in such forests? The hot, moist air is not good for his growth and development; it is never cold, so that little clothing is required. Many of the trees of the forest yield fruits fit for food. But it is very difficult to cut down the forest and carry on agriculture, for the forest grows up again very rapidly. So we find the equatorial forests are inhabited by very backward, uncivilised tribes; some of them, like the Pygmies of the Congo, are of very small size. They wear very little clothing and often have no huts at all, or build small shelters in the trees. Some of them, like the natives of the Amazon Basin, are hunters and wanderers. They live

mainly on the jungle fruits. The climate makes difficult, though far from impossible, any improvement in agriculture or the arts.

2. The Tropical Grasslands and Savanas. The characteristic vegetation of the tropical climate is a rich growth of tall grass with scattered trees. We have learnt of the large area of Africa which has a tropical climate. Nearly all this country is



Photo: Nuffield Organisation.

FIG. 87.—African savana land (East Africa). Notice the grass with small, scattered trees and the lion.

covered with savana. In South Africa and Rhodesia we refer to it as “Bush Veld.” The grass springs up quickly during the rains, but later in the year is scorched by the sun, and the country is dry and brown during the hot season. Trees become more numerous as the rainfall increases. Many of the tropical grasslands have strong winds, and very much wind is bad for the growth of trees. We find many of the trees of

the savana are umbrella-shaped, so that they expose only a narrow edge to the wind.

The animals of the equatorial forest are specially adapted for climbing—the monkeys, for example, escape from their enemies by their speed and cleverness in swinging from one tree to another. In the savana climbing animals would have few trees to climb, and so we find the animals are specially adapted to escape from their enemies by swiftness of flight. We really find two main groups of animals—the swift-footed grass-

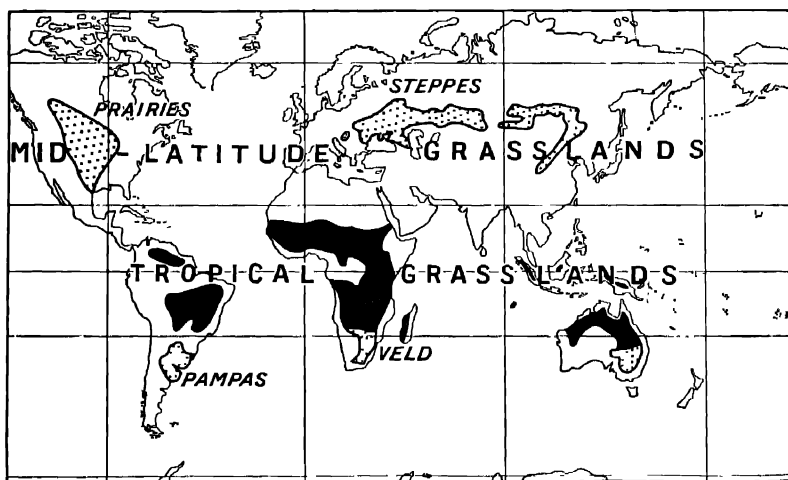


FIG. 88.—The grasslands of the world. The tropical grasslands or savanas are shown in solid black, the mid-latitude grasslands by dots.

eating animals like the antelopes and giraffes, and the savage flesh-eating animals like the lion and tiger which live on them. Very often the grass-eating animals will be disturbed in the midst of a meal and have to run away. So we find many of them swallow their food very quickly, and then when they are quiet and at rest are able to chew it over again—chew the cud, as we say. We have all seen cows do this. Just as the savanas (e.g. in Africa) have supported vast herds of wild grass-eating animals, so man is able to raise great herds of cattle on the tropical grasslands. So we find the inhabitants of the grasslands

are at first hunters hunting the wild animals, later they become pastoral peoples interested in the keeping of herds of cattle. Read what is said of life on the Mid-Latitude Grasslands. It is very similar. There are great stretches of these tropical grasslands in the north of Australia.

3. **The Monsoon Lands.** The natural vegetation of the monsoon lands is typically seen in India. The ground is covered with forests which lose their leaves during the hot season. Trees require a great deal of water, which they drink

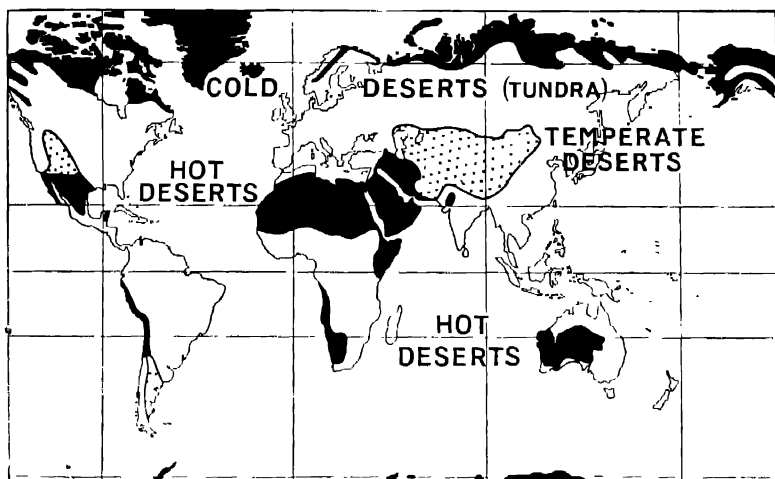


FIG. 89.—The deserts and semi-deserts of the world.

Notice what a large part of the land surface is waste, desert land Try and name each of the desert areas shown on this map

in through their roots and lose by evaporation through their leaves. In the dry, hot weather it is necessary that the trees do not lose too much water. So in the monsoon forests the trees guard against this loss by shedding their leaves. When the rainfall is more than 40 inches the monsoon forests usually consist of fine large trees, of which teak and sal are familiar examples. But as the rainfall gets less the trees become smaller, and many of them are armed with thorns. The forest, as we say, passes into thorn forest and scrubland, and finally into desert with only a few scattered shrubs. Monsoon forest is

not as thick as equatorial forest, and can more easily be cleared for agriculture. Many plants of great value to man flourish in the monsoon climate. There are timber trees, bamboos, various palms, fruit trees like the mango and bread fruit, as well as plantains and bananas. More important still are the cereals, rice in the wet lands and millet or sesamum in drier parts. On certain soils cotton flourishes; tea and coffee grow well on hill slopes. Maize can also be grown and even wheat as a winter crop.

The monsoon climate is, then, very favourable to the growth of food crops. So we find most of the monsoon lands are very thickly populated. In some parts it is very easy to obtain sufficient food and the people get lazy, but if they do not let themselves get lazy there is great opportunity of becoming rich or learned, and so we find a high state of civilisation in many monsoon lands.

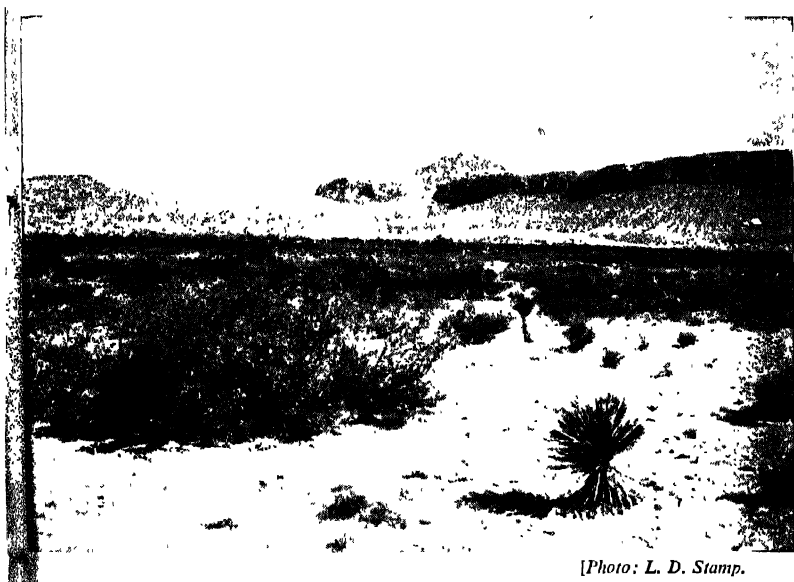
4-5. Tropical and Mid-Latitude Deserts. In talking about the monsoon lands we said that as the rainfall gets less the monsoon forest becomes poorer and poorer, passing first into scrubland and then into desert. In the same way grassland becomes poorer and poorer, and passes eventually into desert. Thus desert is sometimes very, very poor grassland, at other times very, very poor scrub or woodland. There are few deserts where absolutely *nothing* grows. We find desert plants have different means of storing water. Some of them have very, very long roots which go down to great depths and there reach water; many have fleshy stems and leaves in which they can store up water; many prevent the loss of moisture by covering their stems and leaves with a thin coating of wax; the Australian eucalyptus do so by turning their leaves edgewise to the rays of the sun.

Much of the vegetation in arid regions or "semi-deserts" possesses such means of storing water, and is protected from animals at the same time by being armed with sharp spines and thorns which protect them from being eaten.

Then we must not forget the fertile spots, called oases, in the midst of the deserts. Some of these oases consist merely of a clump of palms surrounding a small spring of

water, but others are many hundreds of square miles in area and very fertile. The typical tree is the date-palm.

When we look at the animals of the desert we find there are only a few, and they usually have a dull brown colour which exactly matches the sand and prevents them from being seen. The most typical animal is the camel, which is able to go many days without water and which has a broad foot to prevent it from sinking into the sand.



[Photo: L. D. Stamp.]

FIG. 90.—The vegetation of a semi-desert on the borders of the United States and Mexico.

There are two classes of inhabitants in the desert—the wanderers who move with their camels from place to place, and the settled peoples of the oases who devote themselves to growing cereals and rearing cattle, and especially to the cultivation of the date-palm. People living in the desert have little to see except the vast expanses of rocky and sandy waste. They must study the stars to guide them by night, and so we find that the deserts have produced philosophical peoples—people who have plenty of time to think, and people learned in

mathematics and the study of stars. The wanderers live mainly in tents, but the dwellers in the oases build houses with thick stone walls—to keep them cool—and flat roofs, for there is no need to guard against rain.

6. Mediterranean Lands. In the Mediterranean climate, with its mild moist winter and hot dry summer, the plants grow mainly during the winter and spring and have to protect themselves against loss of moisture during the summer. The vegetation of Mediterranean lands consists chiefly of small trees and shrubs, usually with small leathery leaves well adapted to withstand loss of moisture. Others, such as the olive, have leaves covered with silky hairs; others, like the vine, have very long roots. The Mediterranean trees are remarkable for their fine luscious fruit. The most important plant is perhaps the vine, whose fruit (grapes) is made into wine as well as being dried. Then there are well-known fruits such as oranges, lemons, peaches, apricots, and pears; nuts, such as the almond, and many others. In normal times much canned fruit is sold all over Britain. Notice the labels of the cans. Much of it comes from the “Mediterranean” regions of the world—some from California, some from other Mediterranean lands. Some of the trees protect themselves from loss of moisture by having a very thick bark. This is of value as the source of cork. Wheat grows well in some Mediterranean lands. In damper or irrigated regions rice may sometimes be grown (as in Italy).

The climate of Mediterranean lands is so favourable that it has harboured many of the great civilisations of the world—including Greece and Rome. Soil forms slowly and is precious and is often preserved by careful terracing. This involves much skill and so does the proper use of the limited water supplies. The pleasant climate may tend to make the people lazy and too easily contented, though many are very hard-working. In Mediterranean countries the houses usually possess thick walls of stone, to keep them cool during the summer, and wide covered verandahs for shade. The people often adapt themselves to the climatic conditions by sleeping during the heat of the afternoon.

7. Warm Temperate Forests. The lands having a warm temperate climate are forested, and the forests are often very similar to those of monsoon lands but of different trees. There are five separate areas, each having its own special features:

(a) *Central and Northern China.* Central China now has bare hills because the forests have been removed long ago by the people for firewood. The valleys are very densely populated; rice is the grain in the warmer, wetter parts. Northern China is too dry for many forests and is largely cultivated with millet as the chief crop.

(b) *South-Eastern United States.* Here "cotton is king" and maize is the food grain. Forests remain in the great swampy valleys and pine forests in the sandy country.

(c) *Eastern Australia.* Here are eucalyptus forests, and this is one of the most fertile parts of the continent.

(d) *Natal in South Africa.* This is also a fertile region, growing maize and sugar.

(e) *Southern Brazil.* The forests here yield valuable timber, and from the leaves of one tree South American tea or maté is prepared.

8. Cool Temperate Deciduous Forests. In the monsoon lands, the trees lose their leaves to protect them against the heat of the hot season. In the cool temperate deciduous forests the leaves are lost during the winter to protect the trees against the cold and frost. In America the end of the summer is called the "Fall," because it is then that the leaves fall from the trees before the cold winter comes on. Many of the trees of these forests yield valuable wood—oak, elm, beech, birch, and maple. Forests of this kind formerly clothed a great part of North-Western Europe—including England—but have been cut down to make room for agriculture and pastoral industries. Many grains do well in this climate. We must notice that the plants require much less rain than in countries like India, because the sun is less powerful in summer and does not dry up the moisture to the same extent. Eastern England has a rainfall of about 25 inches (roughly the same as the driest parts of the Deccan in India, which are bare and brown half the year), yet the country is clothed with green grass for the whole year. Also we find

that wheat grows actually better in the drier parts, as in the east of England, than in the wetter parts. In damper regions grass grows richly and affords fine pasture for cattle. Sheep are found in the drier or hilly parts. In damper parts wheat is largely replaced by oats. Barley likes the same climate as wheat,



[Photo: F. Frith & Co., Ltd.]

FIG. 91.—Deciduous forest in winter (England).

Notice that the trees have lost all their leaves and snow covers the branches and the ground.

but will grow on lighter soils and farther north. Over much of the continent of Europe rye is grown on the poorer soils. There is no grain which furnishes such good and nourishing bread as wheat, and the demand for wheat, already enormous, increases yearly amongst both white and coloured races.

On page 114 it was noted that the eastern side of North

America, around the St. Lawrence and the New England States, as well as Manchuria on the east of Asia, had much colder winters. In this, the "St. Lawrence type" of climate, mixed forests of deciduous and coniferous forests occur. These climates are healthy and invigorating. Hard work during the whole year is needed in farming; it is not too hot in summer to prevent work during the whole day, and in the winter work is essential to keep warm. So we find the great North European and American civilisations have been fostered

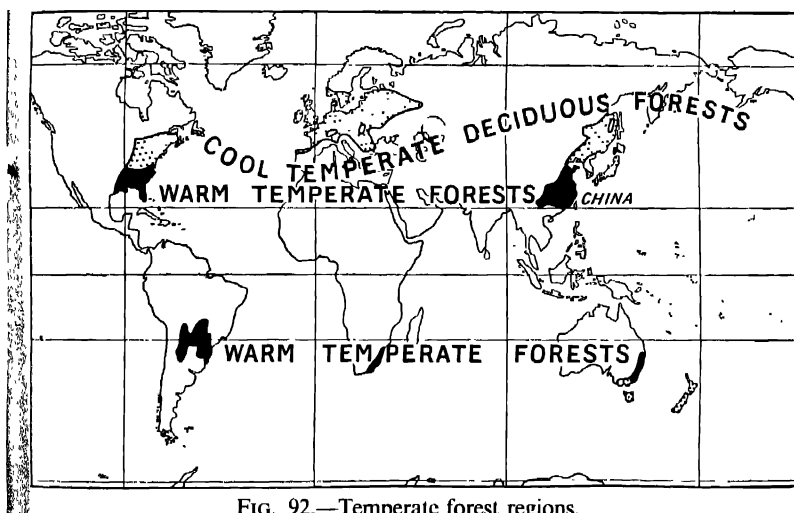


FIG. 92.—Temperate forest regions.

Notice that these are found in at least three different climatic regions

by these climates. The houses must be substantially built, for the winters can be very cold and there is no season of the year when rain does not fall.

9. Mid-Latitude Grasslands. The grass in mid-latitude continental climates is usually shorter and less luxuriant than in tropical grasslands, and flourishes even with a rainfall of less than 15 inches. There are vast stretches of these lands without a single tree. The mid-latitude grasslands have received different names in different continents—Steppes in Asia and Europe, Prairies in North America, Pampas in South America,

High Veld in South Africa, and Downland in Australia—but they are very similar throughout. In spring the ground is fresh and green and rich with flowers, in summer the sun scorches the grass and the whole country becomes brown, whilst in winter it is often snow-covered and the rivers turned to ice (except in the Southern Hemisphere).

As in the tropical grasslands, we find swift-footed grass-



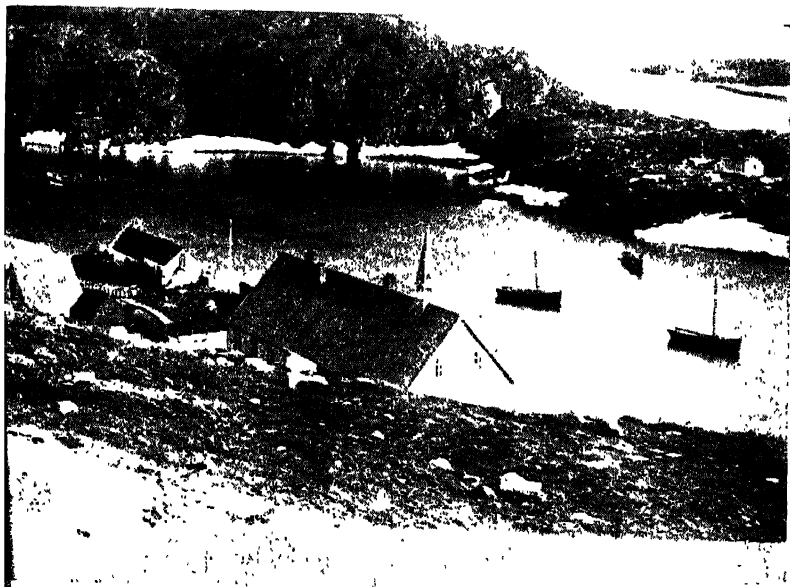
[Photo: E. C. Stamp.]

FIG. 93.—Coniferous forest amongst the Rocky mountains at Banff, Canada.

eating animals. The horse, ass, and sheep are all typical of these lands.

The original inhabitants of the grasslands were nomads. They wandered about from place to place with their flocks, for when the grass dried up in one region, a move had to be made to find fresh pasture elsewhere. In richer regions cattle were important, in drier parts sheep and goats. The people were fine horsemen, for they had to spend much of their time riding, watching the vast flocks and herds. In past ages the

grasslands have acted as great "reservoirs" of people. After a series of bad seasons it may be necessary for a great mass of people with their herds and flocks to move bodily in search of fresh lands. In this way great waves of people have swarmed out of the grasslands and settled in surrounding countries. In the centre of Arabia are grasslands from which the Arabs have come out and overwhelmed the lands round about.



[Photo. Moravian Missions.]

FIG. 94.—Killinek, Labrador, in the warm season.

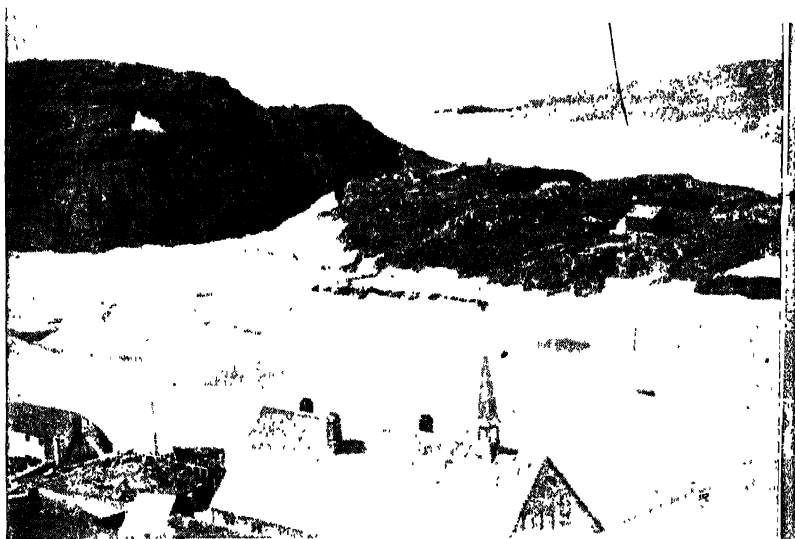
Notice the bare ground of the Tundra region.

In recent times most of the grasslands have become vast cattle and sheep ranches whilst the richer areas have been rendered suitable for wheat cultivation, and arable farming has largely replaced the pastoral industries.

10. **Cold Temperate Coniferous Forests.** Stretching as a great belt across the Northern Hemisphere is a vast tract of evergreen trees with needle-shaped leaves—trees which yield valuable soft timber. Much of the moisture in this region falls as snow and not as rain. The forests are inhabited by animals

which have a thick fur to protect them from the bitter cold of winter. So many of the inhabitants are hunters. Naturally, logging and timber-working industries are important. The trees are felled during the winter, dragged over the slippery snow and floated down the rivers when the snows melt.

Similar forests cover large areas of the higher regions of



[Photo Moravian Missions]

FIG. 95.—Killinck, Labrador, in the cold season.

Notice that the sea is frozen over. Notice the steamer in the far distance frozen into the ice. This photograph was taken in the cold season, but there is little snow to cover the bare rocks.

Central Europe—there are fine forests on the mountains of Germany and Switzerland and the Carpathians. As wood is abundant it is the general material for dwellings, which range from the rough log-huts of the North American settlers to the fine wooden “chalets” of Switzerland. The mountainous parts of New Zealand, Tasmania, and South-Eastern Australia are sufficiently cold for coniferous forests to grow well. Except in plantations, however, there are no true pine:

forests in Australasia, and the area of such forests in the whole Southern Hemisphere is very small. In the coniferous forest fire is sometimes very much to be feared, for it destroys the whole forest and is very difficult to check.

11. **The Tundras or Cold Deserts.** In Arctic and Antarctic regions are vast stretches of desert land—desert not because of the heat as the hot deserts, but because of the extreme cold.



[Photo: L. D. Stamp.]

FIG. 96.—Alpine vegetation near the tree limit. Notice the stunted, bushlike pine trees.

It is too cold for the growth of trees, and practically the only vegetation is moss and lichens. The reindeer is almost the only animal, and furnishes meat, milk, and clothes for the few poor inhabitants of these dreary "barren lands." Agriculture is impossible, for the surface is frozen for three-quarters of the year and the sub-soil is permanently frozen. In some parts of the tundras the short, sharp summer produces a wealth of flowers, but for the remainder of the year the ground is snow covered.

12. Alpine Vegetation. As we ascend the sides of a mountain we often pass through almost the same vegetation zones as if we went on a long journey towards the poles. Thus in the Tropics we should pass from dense Tropical Forests to Evergreen Forests, more like those in warm temperate lands. Above these we find coniferous forests, and as we go upwards the trees become smaller and smaller until the "tree limit" is reached. Above this line, or at intervals amongst the forests, are grasslands or "alpine pastures." These "alps" are important because they afford pasture for sheep and cattle in the summer, but when the winter snows come the animals are driven down into the valleys. This seasonal movement of animals is called "transhumance." Often above the alpine pastures are tracts of alpine vegetation, consisting of scattered clumps of flowering plants. Then the snow line is reached, above which the warmth of summer is insufficient to melt the snow of winter and so the ground is permanently covered with snow.

F. MAN ON THE EARTH

IN the last section we learnt how much man is influenced by the climate and vegetation of the countries in which he lives. The more backward and uncivilised tribes are almost completely controlled by their surroundings, and as examples we have the Pygmies of the Congo Basin, the American Indians of the Amazon, and the Eskimos of the Tundras. As man grows wiser and begins to apply his knowledge or, as we say, becomes more civilised, he is able to overcome many of the disadvantages of his surroundings. He brings water in canals and makes deserts fertile—as he has done in many of the dry parts of India; he clears away large areas of forest and plants crops suitable for food; he grows grain on the grasslands where formerly he wandered about with only his herds. Again, he can build railways and ports so that food can be brought quickly to even the most barren desert places; telegraph lines and wireless stations keep every part of the world in direct touch with the great centres of life. Gradually man seems to be conquering the terrible diseases of the world, and it is now possible to live in unhealthy parts of the earth where formerly man found it difficult to remain alive.

There are still, however, enormous areas of the world where all the efforts of man are of little use. He cannot make fertile the great frozen wastes of the Tundra lands, because he is unable to prevent the ground freezing and the coasts becoming blocked with ice. He is unable to render fertile enormous hot deserts like the Sahara, though he may one day try. Again, in the regions of the great equatorial forests like the Amazon Basin his efforts to clear the forest and make room for cultivation are overwhelmed by Nature, which causes the forest trees to spring up again with great persistence, or washes away the soil left bare for a short time.

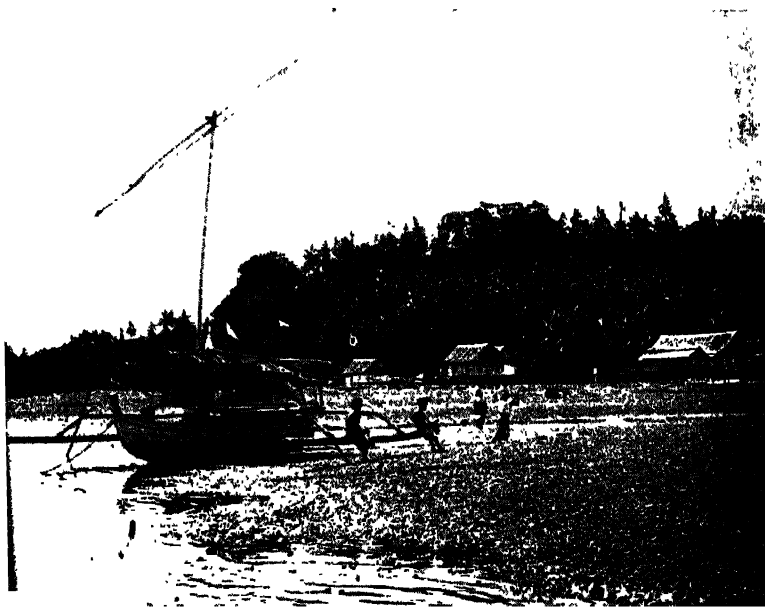
OCCUPATIONS OF MAN (PRIMITIVE PEOPLES)

We are now going to study the main occupations of man in different parts of the world. We shall start with the simple occupations of primitive man before he learns the arts of civilisation.

Gatherers. There are still a few peoples in the world who live mainly on the fruits or roots of plants they find growing wild. Their life is spent in gathering sufficient for their daily food. As a rule they are hunters too, and sometimes fishermen. They wander about from place to place in their search for fruit and animals. They are only able to make the very poorest huts or dwellings. The men and women have a hard life; they often die of hunger, they are often small in stature and weak. We find such peoples both in the thick forests along the equator—the Pygmies of Africa and the Amerinds of the Amazon—and on the fringes of the deserts—the Bushmen of South Africa and the Australian natives. Often they have fled to these inhospitable regions because stronger and more civilised tribes have taken possession of all the better lands.

Fishermen. We find people who depend mainly on fishing for their existence all over the world, both amongst backward and amongst highly civilised races. In the frozen north are to be found the Eskimo and the inhabitants of the Barren Grounds of North America; in Equatorial regions are peoples like the “Sea Gypsies,” who live amongst the islands of Lower Burma and Malaya. There are some regions of the sea which are specially favourable to fish and where fish are found in enormous numbers. Such regions attract men of the civilised nations, and they spend their lives as fishermen. Examples are Newfoundland, off which island is the Grand Bank famous for cod; the western coast of Canada, where the rivers are full of salmon. Much of the tinned salmon sold all over the British Isles comes from here. Then there is the shallow water of the North Sea, which attracts fishermen from Britain, Norway, and Germany. Most fishermen spend much of their time on their boats, but build villages and towns along the

nearest sea-coast, where their wives and families dwell and where they can live in stormy weather. Some fishermen have to go great distances to their fishing ground—such as those who go after whales in polar seas. Native fishermen are usually skilful swimmers and divers. Many nations who in their early days were very largely fishermen have developed



[Photo: E. N. A.]

FIG. 97.—A fishing village in the tropics (Celebes).

Notice the hut built on piles on the sandy shore, with coconut palms in the background and the fishing boat in front.

into great seafaring nations. Examples are the Norwegians, British, and Japanese.

Hunters. All over the world wild animals are becoming more and more scarce, and there are now very few peoples who live entirely by hunting. In the old days little groups of men or tribes wandered about the great grasslands of the world in search of animals for food. Good examples were the North American Indians—"Red Indians" as they are often called

although they have no connection at all with the inhabitants of India. Many of the peoples of Africa were also hunters. The men did most of the hunting, while the women stayed behind to prepare the food and make rough shelters for the hunters when they returned. Where once the Indians roamed across the prairies of America we now find trains roaring



[Photo: Aerofilms.]

FIG. 98.—A fishing village in England.

Notice the small harbour with the fishermen's boats, and contrast the fishermen's cottages built of stone or brick for warmth in winter with the huts in the preceding photograph.

along with their load of grain from the far-stretching wheat-lands which have replaced the wild, grassy plains. Hunting is still important in the far north, but the animals are no longer hunted for the sake of food but for their skins and furs.

Shepherds. Whilst the people of the grasslands of Africa and America were hunting wild animals until recently, the inhabitants of similiar regions in Europe and Asia had for thousands of years been keeping flocks of sheep, goats, and

cattle. For travelling and for moving about rapidly to tend their flocks they kept horses and asses and became very skilled horsemen. In the old days a man's wealth was reckoned by the number of sheep and cattle he possessed, for from them he and his family supplied all their needs: food, drink (milk), clothing (from wool), and even their dwellings, which were made of skins. Water was often scarce in the grasslands and was carried about in bottles made from the whole skins of animals, just as you may see it carried about in many parts of India to-day. The shepherd peoples had to wander about from place to place in search of good grass, and often, in bad years, they moved far away and found some fertile land where they drove out the native inhabitants and settled down to farming.

Farmers. A large proportion of the peoples of the world can be classed as farmers or cultivators. We find all stages from the wild tribes of Central Africa, who make a small clearing in the forest around their villages and grow just sufficient for their daily food, to the cultivators whose life is devoted to the production of quantities of wheat, not only for themselves but for sale. Let us consider here the primitive farmers who have only their own wants to consider. As a rule they build a small village with huts which are just sufficient for shelter from sun and rain, and constructed of the wood of the local forest and thatched with grass or leaves. They keep a few cattle, usually for ploughing. A small area of land is cleared—in some countries it is often cleared by burning, so that the ashes of the trees nourish the ground—and a few crops grown. After one, two, or more years when the soil becomes poor another area of forest is cleared. This process is very wasteful, and large areas of valuable forest have been destroyed in this way in tropical Africa and other countries. In the British Isles the reckless destruction of forests has wasted much valuable timber and has left them the least wooded country in Europe.

OCCUPATIONS OF MAN (ADVANCED PEOPLES)

Primitive people who live entirely on what they themselves can grow or make must be content with a very little. As soon

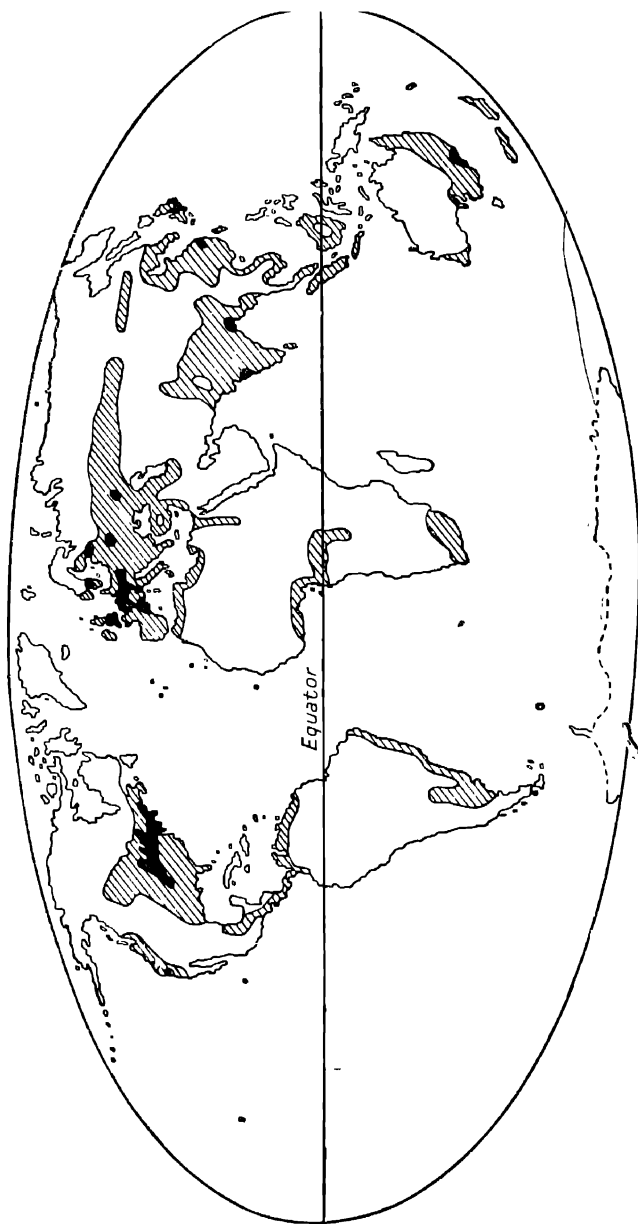


FIG. 99.—Agricultural and industrial regions of the world. Industrial regions black, agricultural regions lined.

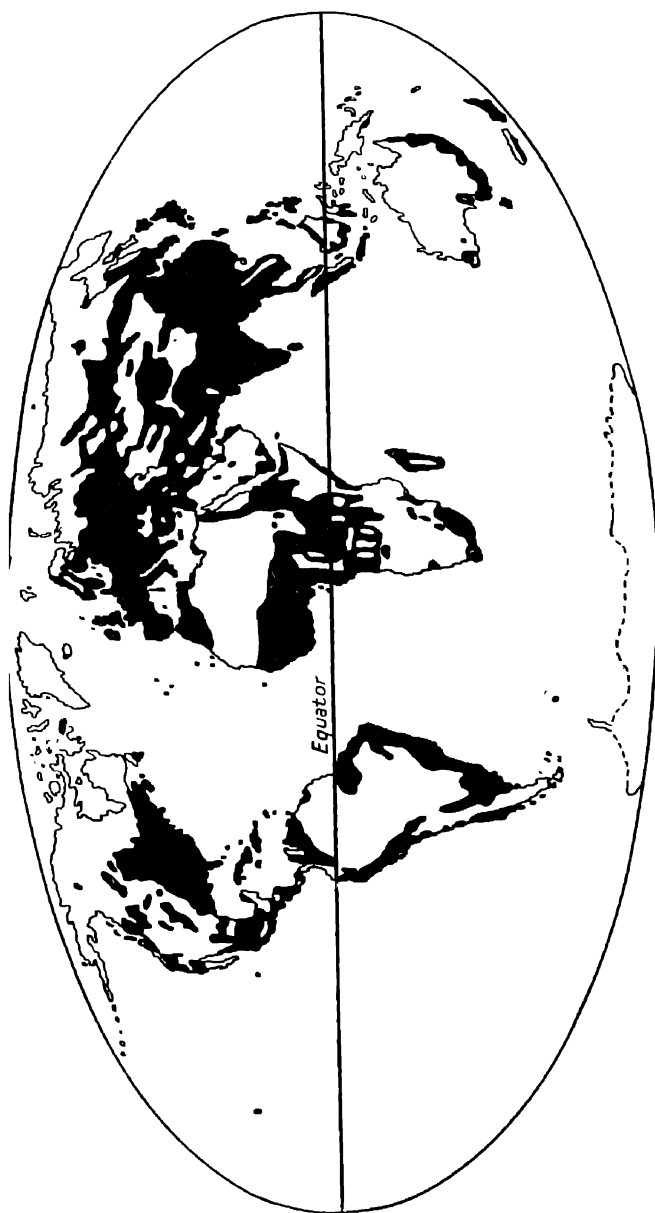


FIG. 100.—Population map of the world. All parts in black have more than eight persons living on each square mile of ground.

as people learn about the world around them they realise that there are many things they can do to improve their condition of living, but at the same time that there are many most desirable things which they cannot produce themselves. Civilisation commenced when people began to realise that they should strive to better their existence. Gradually man realised that the natural grains and fruits could be improved by cultivation, and so agriculture began. Then came the knowledge that for efficient working some must devote themselves to one work and some to another (division of labour). Later came the knowledge that many of the comforts they desired could only be obtained from outside countries, and foreign trade commenced.

If we look at any civilised country at the present day we notice that there are different sections of the people who each have their particular work to do, yet each group is essential to the life of the country. There are the farmers or cultivators who produce the food, the merchants and shopkeepers who buy and sell, the people who work the railways, steamers, and other means of travelling from one place to another, the builders who construct the houses, the teachers who look after the education of the children, and so on. We find, too, that every country produces something which it is able to send away to other countries, and every country has something which it must receive in exchange. Some very big countries can produce most of the things they require, but not all.

Agriculture and Industry. If we look at the whole world we find we can separate the people into two broad groups. There are the people who grow things and the people who make things. The growing of things can be grouped under the term "agriculture," and the making of things under the term "industry." In its simplest form trade consists of the exchange of food between the people who grow things and the people who make things. Although nearly all countries both grow and make things, usually one is more important than the other and so each country or each big region of a country can be classed as "agricultural" or "industrial." Look at Fig. 99; it shows the main agricultural and the main industrial regions

of the world. Fig. 100 shows the most thickly populated areas in the world. Notice that both agricultural and industrial regions may be thickly populated. Great Britain is on the whole an industrial country: only 8 per cent. of the population depend on agriculture for a living. With the actual workers we include their families and all dependent on them.

There are, of course, other occupations in civilised countries. but again we can divide them into the producing and the manufacturing. Mining is often very important, and we can divide mining and the industries connected with it into the producing side—that is, mining the coal or minerals from the earth—and the manufacturing side, when the metals are extracted from their ores and made into useful articles.

The most essential point to remember is that in primitive peoples we only had to consider their main occupations because the wants of the people are few and they supply them all themselves. Even in the most primitive and backward tribes, however, there is some sort of “division of labour.” We said that with the hunters the men do the hunting whilst the women look after the cooking and domestic arrangements. As the people become more and more civilised the “division of labour” becomes more and more marked and every one has his own particular work to do, and often it is quite different from that of his neighbours. One man may be a clerk, another a shopman, another a farmer, another a miner, another a railwayman, and so on. Yet all of them are equally important to the country.

We will now study some of the most important occupations in civilised countries.

AGRICULTURE

Farming or agriculture is the most important of all, because agriculture supplies the main food of the people. We can distinguish three main kinds:

(a) *Crop farming*—the growing of “crops” of grain in large quantities, such as maize, wheat, barley, etc. With this we can include cotton, flax, etc., which are grown not for food but as raw materials.

(b) *Mixed farming*—when each farmer grows a variety of crops according to local needs, or according to the suitability of his soils, and also keeps some cattle or sheep.

(c) *Stock farming*—that is, the rearing of cattle and sheep. This is not really “agriculture,” but is usually included under it. The animals are reared both for food (*i.e.* meat), including milk and butter or cheese which is made from it, and also, in the case of sheep, wool for clothing. Hides and skins for leather are other products.

CROP FARMING

Let us now consider some of the most important crops in the world.

Rice. Rice is the most important food grain in monsoon and other hot, wet countries. It is quite different in its requirements from all other grains. The seeds must be sown in a clayey or loamy soil under a few inches of water, and the young plants grow up through the water. As a rule the seeds are sown in “nurseries,” and then the young plants are taken up and planted out by hand in small tufts—again under water. This is very hard work, but the yield of rice is very good and it pays for the trouble. The roots must be surrounded by water until the plant has reached a good size. Then the fields are allowed gradually to dry and the grain to ripen with the sun’s heat. It will be seen that rice requires a great deal of water, and flat land so that the water does not run off. The best land for rice is in the great alluvial plains and deltas like the Ganges Valley and the Irrawaddy Delta. In more hilly countries paddy or rice fields must be made by “terracing,” so that the fields are like a number of flat steps down the hillside or valley. We see this in Ceylon and in many parts of Burma as well as in various parts of India. To do well rice requires 60 to 80 inches of rainfall; with less than that the crops may fail. But huge quantities of rice are grown in irrigated areas, such as the Indus Valley and the dry part of Burma, where the water is brought artificially to the land by canals which man has made.

Rice with the husk on is called paddy, and so Indians nearly

always talk about “paddy-growing” and “paddy-fields”; but European peoples, who only see the paddy when the husk has been removed, call it “rice.”

In monsoon countries the seed is sown during the rains, the rice gradually ripens as the rains cease, and is ready for cutting



[Photo · L. D. Stamp.

FIG. 101.—Paddy terracing (Java).

Notice the large number of small fields cut down the side of the hill, so that no land is wasted

before the really hot weather. In countries nearer the equator, where there are two rainy seasons, two crops a year are often possible. We know that the Warm Temperate Oceanic Climate is very like the Monsoon Climate, and it is also very favourable to rice. Notice in what parts of the world we find

(a) Monsoon Climate, (b) Equatorial Climate, (c) Warm Temperate Oceanic Climate. These will be the rice-producing areas, and more rice will be produced where the lands are inhabited by civilised peoples. A little rice can be grown in some parts of the Mediterranean regions where there is sufficient water. The grain grows in the warm moist winter and ripens in the early part of the hot summer. Look at the map and notice the countries.

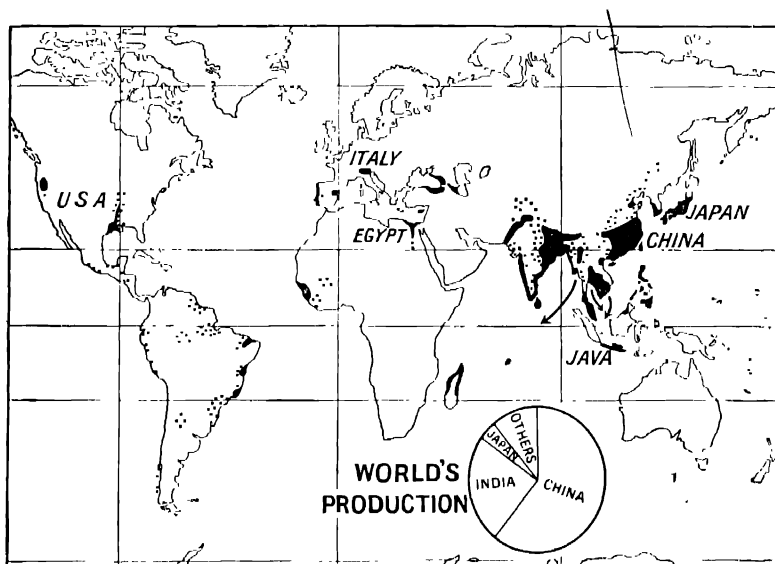


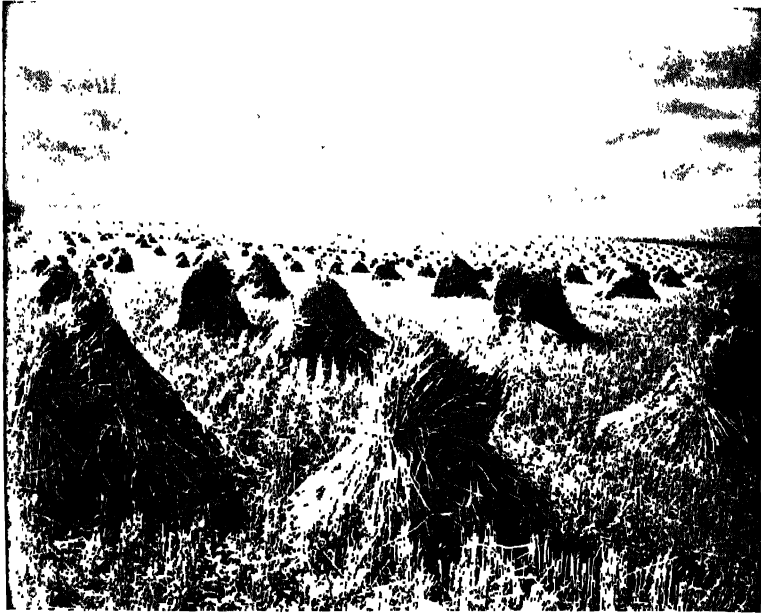
FIG.102.—Rice lands of the world. The three arrows show the regions from which rice is exported.

Notice that China and India, which grow the most rice, have none to spare for export. Rice is exported mainly from Burma, Siam, and French Indo-China.

Maize or Indian Corn. This grain does not require nearly so much water as rice; it grows, too, in cooler places. We must notice, too, that it is grown for several purposes; sometimes the grain is required for food, but at other times it is grown as food for cattle, both the luscious green shoots and the corn being used. It only rarely forms the principal food of a people, and so it is grown in patches over large areas of the world, but not as the principal crop. Over parts of the United States,

however, it is the principal crop, notably in the famous "Corn Belt." In South Africa it is the principal food of the Africans.

Wheat. Wheat is the most important of all grains since it makes the best flour and bread, that is, the best for the growth of man's body. It forms the principal food of nearly all white peoples, and the demand increases yearly. As a result very



[Photo Canadian National Film Board]

FIG. 103.—A wheatfield in Alberta, Canada. Crop farming on the Prairies.

Notice the huge area devoted entirely to wheat

large areas are given over to wheat cultivation. There are many different varieties, and a variety which is suitable for growth in India with a monsoon climate will not grow at all in England with a cool temperate climate. All varieties of wheat require:

(a) Rain or moisture to make the young plant grow. The growing season should be long, cool, and moist.

(b) Sufficient sun to ripen the grain. The ripening season should be warm and dry, but not too hot. The temperature must be at least 60°F . for about one month. It is important to have a little rain just before the grain ripens. This rain helps to "swell" the grains and make them fine and large.

(c) A good or moderately good and well-drained soil: wheat would die if planted in flat, swampy fields like rice. The

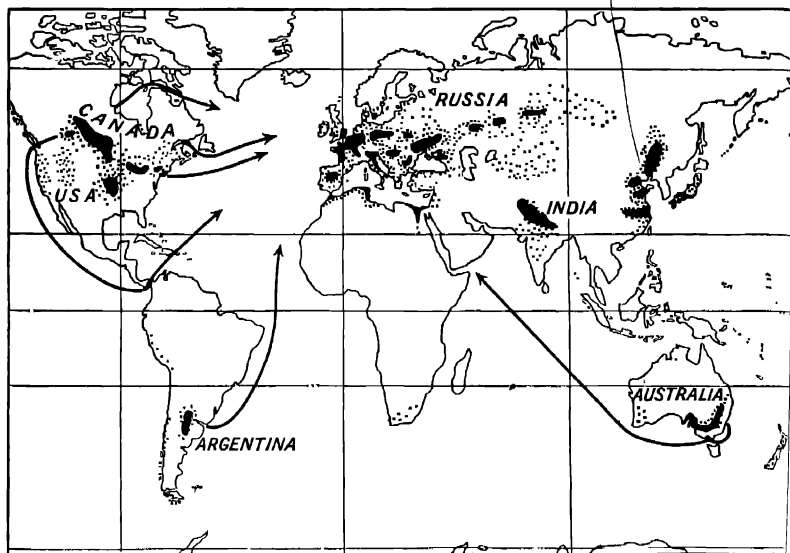


FIG. 104.—Wheatlands of the world. Europe (except Russia) eats more wheat than she can grow and so imports from Canada, U.S.A., Argentina, and Australia. The arrows show directions of export.

best land is gently waving or undulating land, where stagnant water cannot remain round the roots of the plant.

In different countries we find wheat is planted and reaped at different times in order to fit in with the climate:

Cool Temperate "winter wheat" is planted about November in the Northern Hemisphere and April or May in the Southern. It remains in the ground all the winter—it is better if the ground is covered with snow—grows during the spring, and ripens during the summer, so that it is cut before the autumn or fall.

Temperate "spring wheat" is sown in the spring after the winter frosts and snows have gone, but is cut at the same time as the winter wheat or a little later.

Tropical Climates (as India). The seed is sown in the latter part of the rains, and is ready for cutting in the early part of the hot season—January or February in India—but before the great heat commences. It is important that it should have a little moisture about December in order to "swell the grain."

We must remember that wheat is a *grass* which has been carefully cultivated by man. Like the natural grasses, it will flourish best in the Grassland Climates of the world. Just find where the Mid-latitude Grasslands occur. These include many of the principal wheatlands of the world. Study the maps Figs. 88 and 104. Wheat also grows well in the drier parts of the Cool Temperate Oceanic Climate. The deciduous forests of these lands have been much cleared and wheat grown. North-western Europe has this climate, but in the wetter parts the wheat does not flourish. It also grows in a Mediterranean Climate as in Italy or Spain.

Oats, Barley, and Rye. These are other important grains of temperate lands. They flourish where wheat flourishes, but will also grow in colder climates and poorer soils, and hence are found farther north in the Northern Hemisphere. Oats like a cooler and damper climate than wheat, barley prefers light soils and plenty of sunshine, whilst rye will grow in the poorest soils and in climates too severe for wheat. But they all belong mainly to the temperate zone. Rye is especially important in the North European Plain.

Millets. Millets of different kinds are important grains in the Tropics, especially in India, where they grow with a very much smaller rainfall than rice. All over the drier parts of Africa they furnish the principal food grain of the native population.

Sugar comes from two entirely different sources—the sugarcane of hot, wet countries, and the sugar beet (which is a "root crop") of temperate climates. The most important producers of cane sugar are the West Indies, India and Java. Queensland now produces more cane sugar than Australia

herself requires, and Natal as much as South Africa needs, and India enough for home requirements.

Tea is a very favourite drink in many temperate countries and many other parts of the world. Yet the countries which drink most tea cannot produce it themselves. Tea thrives with a monsoon or warm temperate (China type) climate and must be grown on well-drained soil, and hence is usually found on

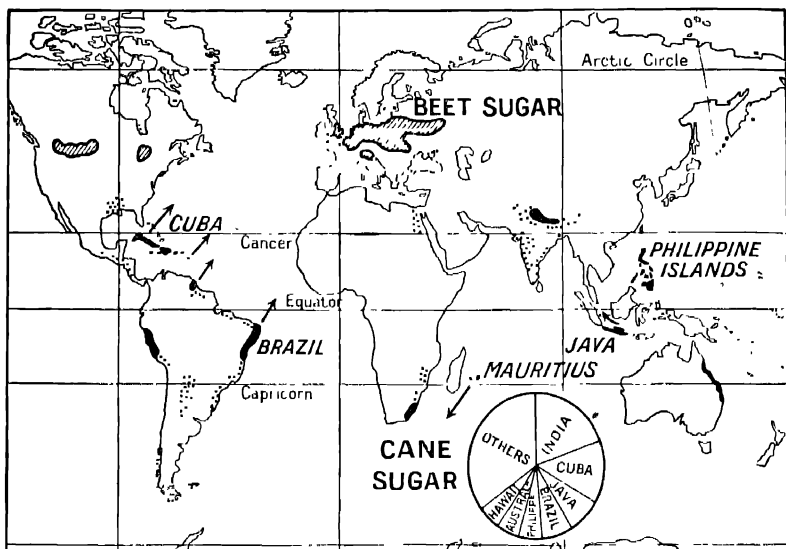


FIG. 105.— Sugar-producing regions of the world. The arrows show the exporting countries. The diagram at the bottom of the map is total production of cane sugar.

hill slopes. We find the necessary conditions in Ceylon, Assam, the East Indies, Japan, and China.

Coffee also grows on slopes, but requires more heat than tea. It might be grown in many countries, but comes principally from Brazil, other tropical South American countries, and Kenya.

Cocoa is obtained from the beans of a small tree growing in the Equatorial Climate on low lands—especially in Ghana,

Nigeria, French West Africa, Tropical South America and the West Indies. Chocolate is made also from the beans.

Mediterranean Fruits. Many different fruit-bearing plants thrive in the Mediterranean Climate. The vine, whose fruits (grapes) are made into wine, is the most important, though the vine also flourishes in other warm sunny lands. We find wine is produced in all of the five regions of the world

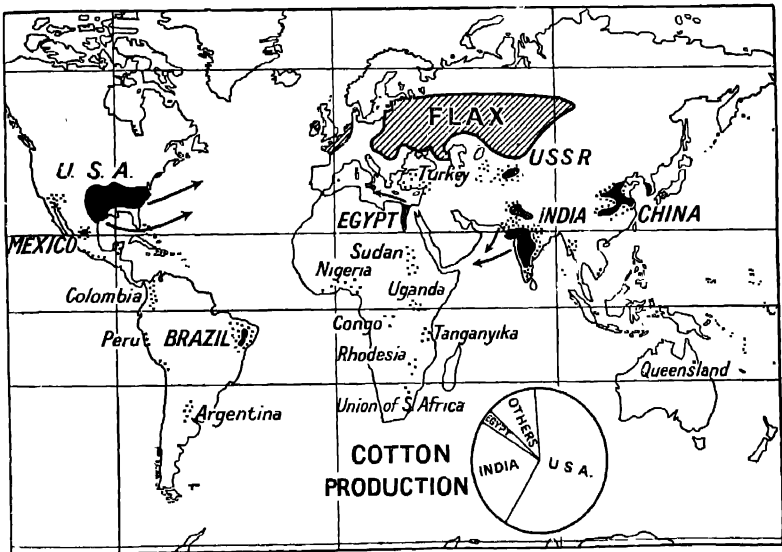


FIG. 106.—Cotton and flax-producing regions of the world. The arrows show the chief countries which export raw cotton. The wheel diagram at the base excludes China.

where the Mediterranean Climate is found. Another, the olive, furnishes olive oil, which is used by the peoples of southern Europe in cooking, just as we use butter. Also important are the fig, apricot, orange and grapefruit.

Cotton is a fibre obtained from the seeds of a plant which grows in the drier parts of monsoon lands, or in the Warm Temperate Oceanic Climate. Thus we find it growing in most of the countries which produce rice, but in the drier parts of them (see Fig. 106). The United States is the largest producer.

Flax, from which linen is made, is the fibre of a plant grown in temperate climates. The same plant grows in the tropics, but it is grown there for the sake of its seeds (linseed), from which oil is obtained.

Jute, from which sacks are made, is the fibre of a plant grown in the delta of the Ganges. Very little is grown elsewhere.

Rubber is obtained chiefly from the juice or latex of a tree growing in the Equatorial Rain Forests. It is now mainly obtained from trees which have been planted in countries in or on the borders of the Equatorial Belt such as Malaya, Indonesia and Ceylon (plantation rubber), but some is still obtained from trees growing wild in the Amazon and Congo Basins.

MIXED FARMING

Mixed farming is very important in thickly populated countries like England and in the more densely settled parts of new countries such as Canada. The farmers grow vegetables, grain such as wheat or oats, keep cattle (for milk and butter as well as for meat) and sheep (for meat as well as for wool). There are several reasons why this is done. First, there is the local market; the people in the neighbouring towns require a great variety of foods. But there is something more important than this. Each crop when it grows draws a certain amount of nourishment out of the ground. Different crops require different things. Thus, if the farmer grows wheat in one field year after year the wheat will soon draw from the soil all the substances which wheat requires. As a result the crop gets poorer and poorer. If, instead of doing this, the farmer changes the crops every year he will get much better results. One year he can grow wheat, the next year vegetables, the third year some other crop. Or sometimes he can let natural grass grow for a time and let cattle or sheep feed on it. Changing the crops year by year is called "rotation of crops." A very usual plan is only to grow wheat every four years. It is very like a man who has a shop in which he sells silk goods, cotton goods, and woollen goods. If everybody who comes into the shop wants to buy cotton goods, the shopman will soon be sold out and will have only silk goods and woollen

goods left. If, however, the first person buys silk, the second cotton, and the third woollen, the whole stock will gradually be sold until it can be replaced. The soil is like a shop where there are a number of substances for sale. We must put into the ground first plants which require one substance, and then plants which require another.

There are two ways in which the whole supply of plant foods in the soil may be renewed. One is by allowing the soil to "rest" or, as we say, remain "fallow" when the agents of weathering cause changes in the soil and it recovers its supply of various plant foods. Or we may add animal manure—sheep and cow dung is much used—or chemical manures. The nitrate manures from South America are much used in Europe but now many "artificial" manures are made in factories. In thickly populated countries, where the ground is too valuable to be allowed to lie fallow even for one year, manuring is usual, but on huge grain farms, as on the open prairies of Canada, the ground is often allowed to lie fallow. Mixed farming is gaining ground even here however. The system of manuring and rotation of crops is called "intensive cultivation." The yield is very good in such cases. For example, in England and Denmark the farmers get on an average 45 to 60 bushels of wheat from every acre sown, but in Australia or the Argentine, where enormous areas are covered, the yield is only 15 to 20 bushels per acre. Mixed farming is carried on especially in the countries of north-western Europe and north-eastern United States. It has been practised for centuries in such densely populated countries as China.

STOCK FARMING

Cattle. In some countries, such as India, cattle are kept principally to draw carts along the roads and streets, or for ploughing. The cows are not nearly so valuable as the bullocks. Some of the people eat the meat and a few people drink the milk, but meat and milk are not important articles of food when compared with rice.

In other countries it is quite different. In Europe and

American cattle are practically never used for ploughing or for pulling carts. Horses or tractors do the ploughing and horses also draw carts. In such countries, too, there are good roads and railways everywhere, so that motors and trains are used much more. In thickly populated countries where mixed farming is carried on, cattle are kept for two purposes. The cows (which may be more valuable than the bullocks) are kept for the sake of their milk. People in northern Europe and a large part of North America use an enormous quantity of milk. From the cream of the milk butter and cheese are made. Keeping cattle for the sake of the milk, butter, and cheese is called *dairy farming*. The bullocks are usually killed when quite young for the sake of their meat.

Cattle thrive best where there are fine rich grasslands, and we find them living in the cooler parts of Tropical grasslands and the wetter parts of Temperate grasslands. Where, as in Canada, Argentina, and part of Australia, there are enormous areas of suitable grassland cattle are kept in great numbers, and here it is mainly for the sake of their flesh. In Australia the northern areas are suitable for beef; the cooler south and New Zealand specialise in dairy produce. It is now possible to send fresh meat from one part of the world to another either "chilled" or in a frozen condition. In this way a great proportion of the meat eaten in Europe is sent right across the equator from the Argentine and Australasia. In all countries where cattle are kept for whatever purpose, the skins or "hides" of the animals are important. From them leather is prepared.

Good grass for cattle grows under similar conditions to those required by wheat, and in many countries we find cattle rearing is being given up for wheat farming.

Sheep. Like cattle, sheep are kept for more than one purpose. They may be kept for the sake of their wool or for their flesh. The sheep which yield the best wool do not always yield the best mutton, and the animals have to be fed according to whether the wool is required or the flesh.

Sheep do not require such good grass as cattle, and are found

in poorer or drier regions. Thus in any grassland country we usually find cattle in the damper parts and sheep in the drier, but both are found in the same country. Thus in England cattle thrive on the damp, lowland pastures; sheep on the poorer hill pastures. In Australia and New Zealand, which are two of the most important countries in the world for wool, mutton, and lamb, sheep-rearing is carried on in the drier regions, cattle-rearing in the wetter.

Goats. Goats can live on still poorer grass and in all sorts of climates. Thus goats are important in the drier parts of Africa and India. Their milk is used and also their flesh and hair (mohair), but they are not nearly as important as sheep.

MINING

Mining is an important occupation in most civilised countries.

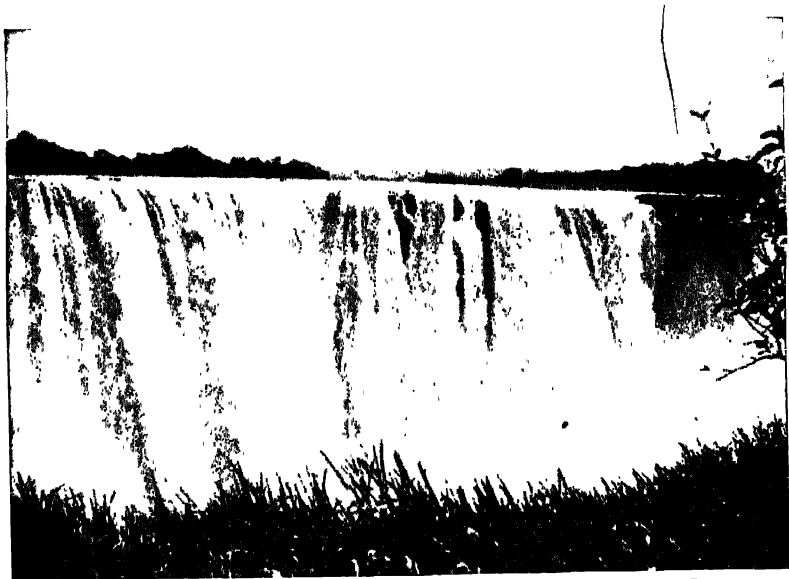
Mining for Metals. The ores of metals are found in old hard rocks, often in mountain regions which are far from towns and cultivated lands. Mining towns and villages spring up in isolated places, and in small mines the miners may lead a very lonely hard life. For example, Broken Hill, in Australia, the great silver-lead mining centre, has sprung up in the middle of an unproductive semi-desert land. Yet a town of 30,000 people has been built, and it is connected by rail with Port Pirie and Adelaide.

Coal Mining. Coal, as we have learnt, is always found in sedimentary rocks, and so in flatter, less mountainous country than most metals. Coal is used as a fuel for factories in a large number of industries, and it is often best to build the factories near the supply of coal. So we find most coalfields have become thickly populated manufacturing areas.

Oil Mining. Oil is found in young soft sedimentary rocks, and so usually in low lands and in very many parts of the world. Oil is obtained by drilling holes in the ground, and the oil either rushes up or is pumped up. The oil when obtained can be sent through pipes for great distances, and so easily taken to places where it is required. Many pipe lines from oilfields are hundreds of miles long. Much oil is burnt by ships, and

so it is pumped to some port where it can be used directly by oil-burning steamers. Still larger quantities are "refined," especially for the production of the gasoline or petrol needed for automobiles and aero-engines. Some oilfields are in busy industrial centres, but others are situated far away in the deserts.

Quarrying. Stone for building, limestone for making lime and cement, some coals and many iron ores are obtained by



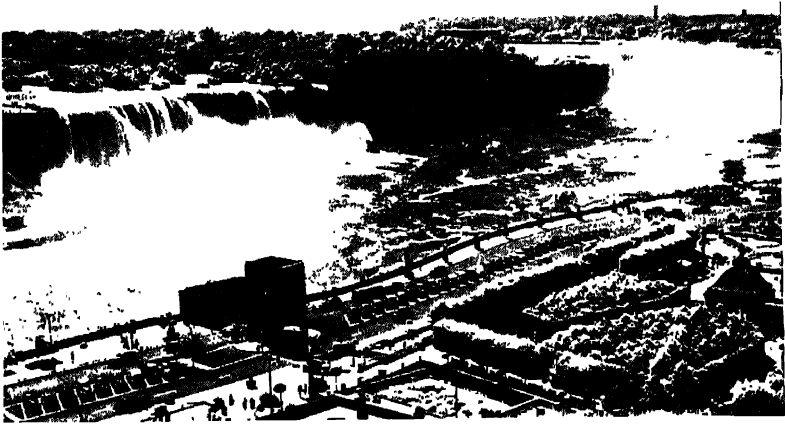
[Photo: E. C. Stamp.]

FIG. 107.—Victoria Falls (the main falls), Rhodesia. A great potential source of power, and works are now in hand for it to be used.

quarrying and not by mining. The difference is that in quarrying we cut away the surface of the earth and so make a large hole (quarry); in mining a long tunnel or a deep shaft is made before we reach the coal or mineral we require, which may be buried deep down. Salt, too, is usually mined or pumped up as brine, but in some countries (Chile) salts called nitrates are obtained from the surface of the deserts. Why should surface deposits of such salts be found only in dry countries?

INDUSTRIAL OCCUPATIONS

In the old days nearly all articles were made slowly by hand, and it required a very large number of people to make only a few things. Cloth, silk, pottery, metal articles were all made in small quantities by hand. But a great change has taken place in the world during the past century. The change is so great that it is often referred to as the "Industrial Revolution."



[Photo: Canadian National Film Board.]

FIG. 108.—Niagara Falls. Here the great fall of water has already been used by man to generate electricity.

In countries such as India we find industrial occupations are carried on in two very different ways:

(a) At certain large centres, such as around Bombay and Calcutta, goods are manufactured by machinery in big factories and large quantities are produced.

(b) In numbers of native villages the old industries, such as the spinning of cotton into threads and the weaving of cotton for clothes, making of pottery, etc., are still carried on as they have been for hundreds of years, "by hand." Such existing industries are often called "village industries."

In other countries it is quite different. In the United States, British Isles, France, Belgium, Germany, and the other industrial countries, including the manufacturing centres of "new countries," *e.g.* Australia, nearly everything is done by machinery—manufacture by hand has practically disappeared.

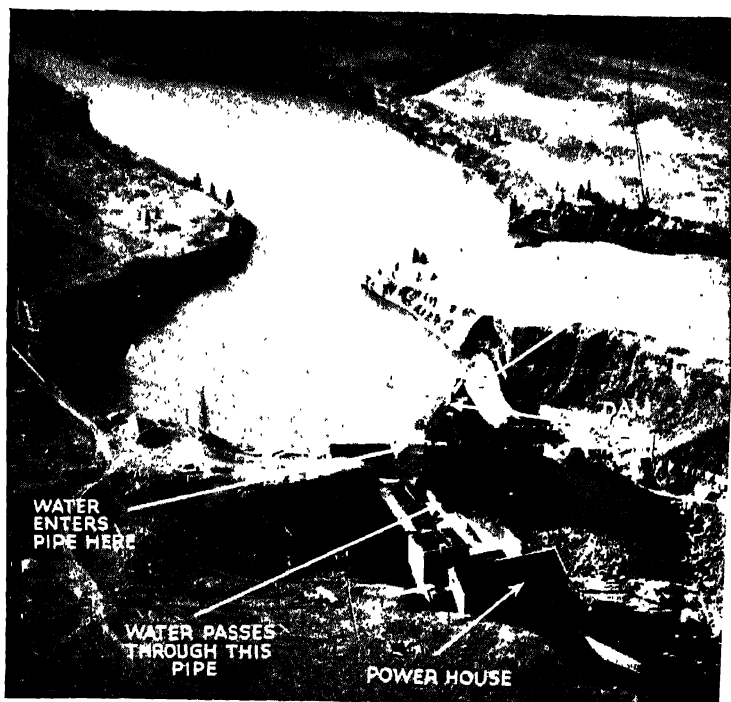


FIG. 109.—Aerial view of a hydro-electric power works.

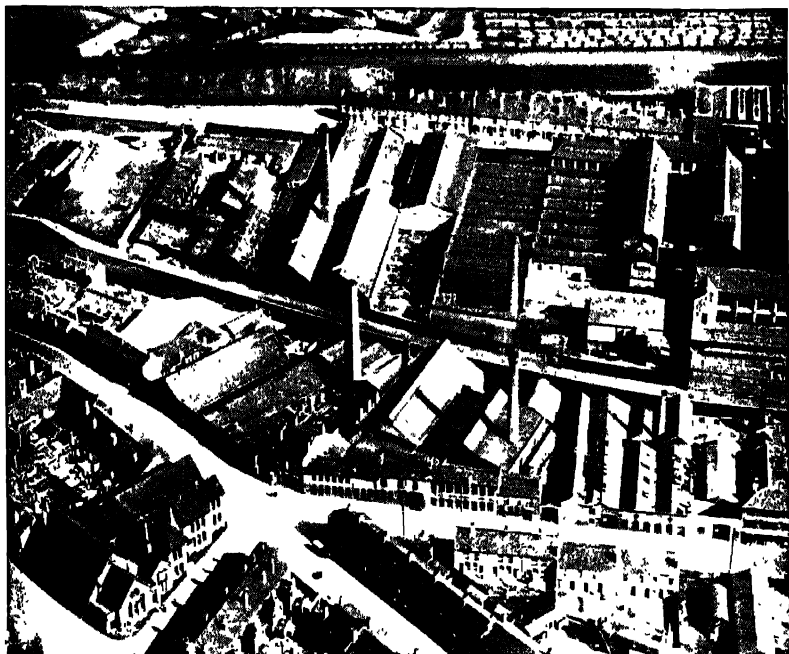
Notice how an artificial lake has been created by the building of a dam and how the water is led through giant pipes to work the turbines in the power house and so to make electricity.

A very large number of people are employed in industrial occupations, and there is a great variety of work for them to do. We must have "skilled workmen" to do the important work; "unskilled workmen" to do the heavy work which does not require special training. Then we must have clerks to

keep accounts and do office work. Then there are salesmen and shopkeepers who sell the goods.

INDUSTRIAL CENTRES

Why have the industrial centres grown where they are?



[Photo: Central Aerophoto Co.]

FIG. 110.—An industrial town from the air.

Notice the factory and the way in which it is reached by railway, canal, and roads. Notice the workmen's houses surrounding it.

We must now notice the causes which give rise to the foundation of great industrial centres. There should be:

(a) Power to drive the machinery. The main sources are coal or oil or water power. Very often the coal or water power is used to generate electricity by which the machinery is worked. We find many industrial regions situated on coal-fields or near great waterfalls or rapid rivers whose water has

been "harnessed" to do work (as in Canada). Oil can be pumped great distances, and so it is more easily brought *to* a place. Electricity also can be carried along wires for considerable distances, indeed up to 300 miles, so that the electricity can be made in one place and carried to work machinery a great distance away, as is done from Niagara Falls.

(b) A supply of raw material.

(c) A large population to purchase the goods and supply the necessary labour.

(d) Good communications—railways, canals, or steamship routes—to carry the goods to distant parts or to bring the raw material in. Heavy industries—those using heavy or bulky raw materials such as iron ore or producing heavy manufactures (*e.g.* steel, ships)—are usually located near the sea or navigable water. Light industries often rely largely on road transport.

(e) Climate should be good, and sometimes climate is important in actual manufacture. Thus the dampness of the air of Lancashire was formerly an important factor in the spinning of cotton.

(f) A good supply of water, usually soft water, is required.

There are also many non-geographical factors, notably a supply of money or capital.

It is almost impossible to have *all* these conditions in one place, so the places which have *most* advantages are usually chosen.

COMMERCE OR TRADE

We have said that trade in its simplest form is an exchange of food for manufactured goods. Thus we find industrial countries like England and Germany buy food but sell manufactures. Australia—a country still largely agricultural—sells food and raw materials (such as wheat and wool), but buys manufactures which she does not yet make herself. The goods sold by a country are called its exports; the goods purchased by a country are called its imports. The buying and selling and all that is connected therewith constitute commerce.

TRANSPORT AND COMMUNICATIONS

We cannot buy and sell goods without carrying them from one place to another. Foodstuffs grown in the countryside have to be taken to the towns; farm implements made in the town factories have to be taken to the farms. In a large country goods have to be brought from one part of the country to another. In the commerce between different countries the goods have to be brought from one country to the other.

Transport by Land. A very important means of transport in most countries is the railway. In some flat countries rivers and canals are much used, and motor transport on roads has now become very important, both for long and short distances. In those countries where railways and roads do not reach every part, many of the old methods of transport still prevail. These methods vary with the country. In the frozen north reindeer or dogs drag sledges over the snow. In mountainous countries mules are most important; in India, in forest country without roads, elephants are still used. In deserts camel caravans alone can be used, because the camels can go long periods without water and their broad feet do not sink into the sand. In the jungles of the tropics coolies are used. Where rough tracks exist, as over some parts of South Africa, ox-waggons are still sometimes used. All these means of transport are slow compared with the railway, and the loads carried are small. More and more motors and trucks are used, even in countries where the tracks can only be used in the dry season. Bicycles, too, have become universal and can be used even on jungle paths.

Transport by Rivers and Canals. Goods can be carried very cheaply by water. In many cases only the original cost of the boat and the wages of the boatmen have to be considered, for the boat itself can be carried along by the wind. When steamers are used we must remember that one ton of coal burnt on a steamer will drag a load nearly twenty times as heavy as a train on land burning the same amount of coal. On some canals in Europe horses walk along the towing-path

by the side of the canal and drag a heavily laden barge. In India three or four coolies do the same thing. A horse is able to pull a barge with a load weighing 40 tons, but on land a horse can only drag a cart containing two tons at the most. So transport by water is cheap, but it is slow. If rivers flow in the direction required, river transport is important (as it used to be on the Mississippi and still is in Europe on the Rhine). Only rivers which have no rapids, waterfalls, or dangerous currents can be used. If, on the other hand, it is



FIG. 111.—Camel transport in the dry north-west of India. The camels are laden with bales of cotton.

necessary to cut canals, that is very expensive, and ships passing through must pay “dues.” Nevertheless canals are very useful where they join one river system to another. We shall speak later about the very important ship canals like the Suez and Panama Canals.

Transport by Railway. Railways have many advantages. They carry goods very quickly, and they can be constructed in almost any direction—except in very mountainous countries where the cost becomes very great. Transport by railway is more expensive than by water, because it costs a great deal

to build the railway, and the engines, trucks, etc., are all expensive. Then railways burn much coal, and many men have to be employed to look after them.

Railways in different countries are of different sizes, and we measure their size by the distance between the two rails, which we call the "gauge." We may distinguish three important sets of gauges:

- (1) The broad gauges—when the rails are more than 4 feet $8\frac{1}{2}$ inches apart (as in India and Russia).
- (2) The standard gauge—when the rails are 4 feet $8\frac{1}{2}$ inches apart (in North America and all over Europe, except Spain and Portugal and Russia).
- (3) The narrow gauges—when the rails are less than 4 feet $8\frac{1}{2}$ inches (usually a metre as in parts of India, or 3 feet 6 inches as in South Africa and New Zealand).

Standard- and broad-gauge trains are larger, can travel more rapidly, and carry more goods, but the lines are expensive to build and cannot be built round sharp curves. Narrow-gauge trains are smaller and slower, but the lines are more easily built in mountainous countries, as they can be taken round quite sharp corners and curves.

The standard gauge, as used in most of Europe and North America, is perhaps the best for all purposes. The biggest and fastest trains in the world, travelling at an average speed of over 60 miles an hour, are on this gauge.

Transport by Sea. Commerce between countries is carried on largely by means of steamers. It may be thought that ships can go anywhere on the ocean. So they can, except where the water is very shallow or ice-covered. But we find that most ships always go along definite lines, which we call "ocean highways" or "shipping lanes" and "ocean trade routes." In other parts of the ocean it is often a very rare sight to see a steamer at all. Why should steamers usually use definite routes in this way? It is because the ocean trade routes are well known, there are good maps, and no fear of the ship striking against small islands or rocks which have not been discovered before. Dangerous places are carefully marked by lighthouses and lightships. At intervals there are "coaling

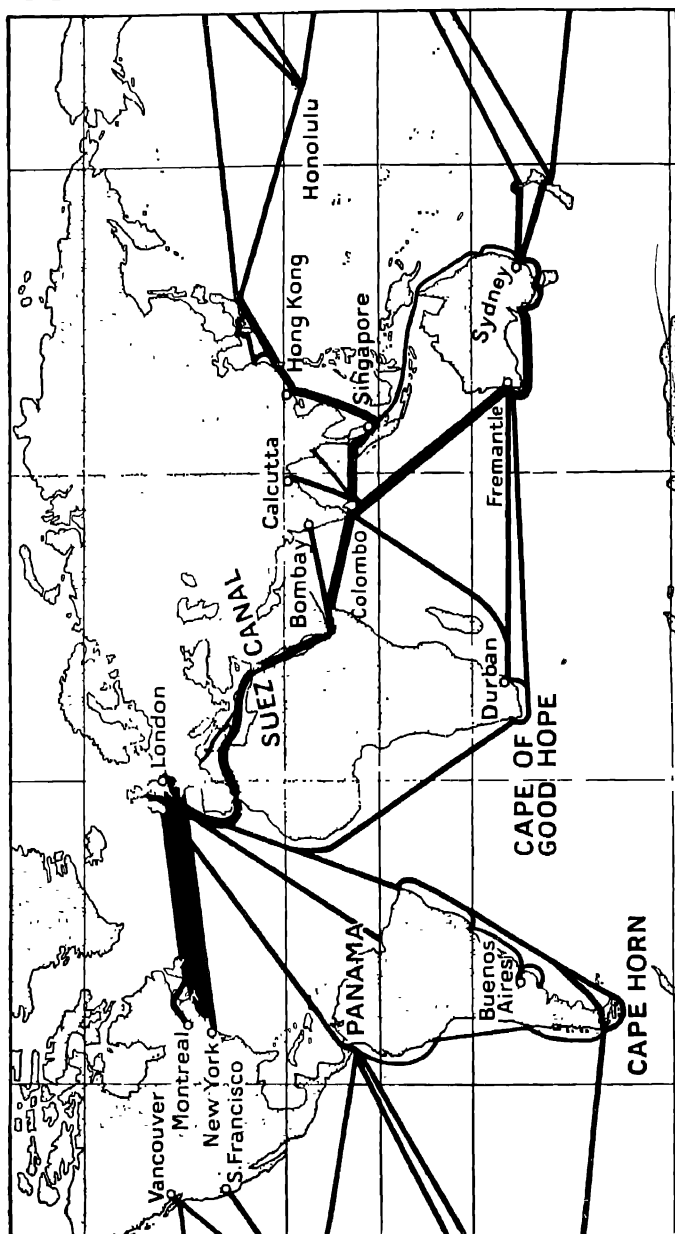


Fig. 112.—Ocean trade routes.

The breadth of the line is roughly proportional to the importance of the route for passengers and goods. A number of important coastal routes, such as Vancouver to Panama and New York to South America have been omitted for the sake of clearness. Note the "ocean junction" of Colombo.

stations,” and “oiling stations” where ships may obtain coal and oil and other things they may require. If a ship is damaged there will be others using the same highway which can quickly come and help.

Let us now look at the principal ocean trade routes of the world.

(a) *The North Atlantic Routes*—from the crowded countries of Europe across to the eastern coast of America. This is the busiest route in the world and has the largest ships. In early summer there are dangerous icebergs near the American coast—brought by the cold Labrador Current—and to avoid these the route is farther south in this season.

(b) *The Suez Canal Route*—from the countries of Europe through the Mediterranean Sea to the Suez Canal. The Suez Canal is about 100 miles long and was opened in 1870. It has made an enormous difference to the trade routes of the world, and the Suez Route is now the second busiest. The very largest ships cannot pass through, so the Australia-bound steamers are not as large as those which cross the Atlantic. From the Suez Canal the route runs down the Red Sea and there divides, one branch going direct to Bombay, the other route to Colombo. At Colombo it again divides, one route going to Madras and Calcutta, another to Rangoon, others to Singapore, China and Japan, and to Australia.

(c) *The Cape Route*. It costs a great deal to keep up the Suez Canal, and each ship has to pay a great deal to go through. Some ships find it cheaper to follow the old route round the Cape of Good Hope—this route runs from Europe to South Africa, and other branches go to Australia and India.

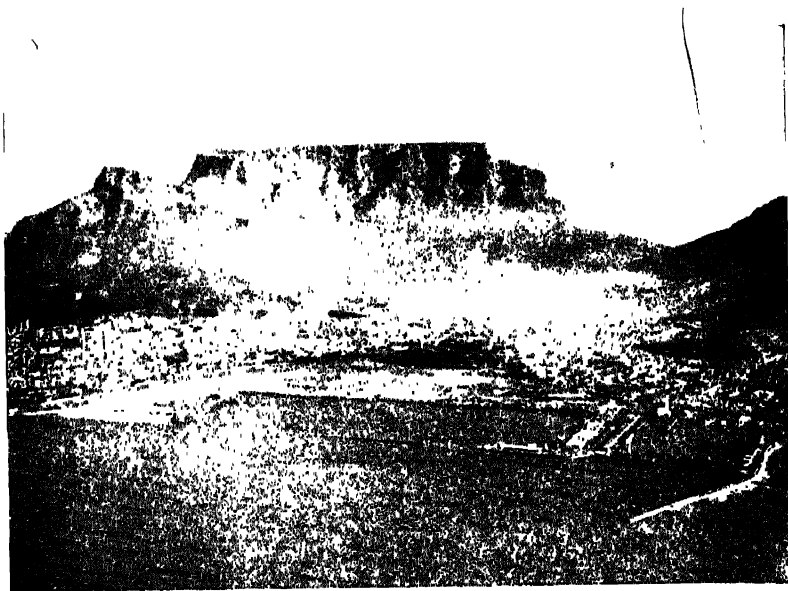
(d) *Panama Canal Route*. The Panama Canal has made the Pacific coast of North and South America very much more easily reached from both the eastern coast of North America and from Europe.

(e) *South Atlantic Routes*—from Europe to South America—are less important; but much meat and wheat are sent from Argentina to Europe.

(f) *Pacific Routes*. There are two main series of routes across the Pacific: one which goes direct from Japan to

Vancouver or San Francisco; the other which uses the island of Hawaii (with its port Honolulu) in the centre of the Pacific as a port of call.

In the old days ocean routes depended largely on the winds, but there are now few sailing ships and winds are less important. Even the biggest steamers fear icebergs and cyclones, and try to avoid both.



(Photo: South African Railways Publicity Dept.)

FIG. 113.—Cape Town docks from the air.

A good example of an artificial harbour. Notice the large area of made ground.

Ports. At the ends of the great trade routes are the great ports—centres of the world's trade. A port should have:

- (a) A good harbour for the ships.
- (b) Good communication with a fertile or thickly populated region behind it. The region behind a port, whose products are naturally sent to the port for despatch to other countries, is called its "Hinterland."

Many ports are at or near the mouths of great rivers, and the basins of the rivers form their "hinterlands." New Orleans is an example, Calcutta another. Some ports have fine natural bays which serve as harbours. Sydney and Melbourne (Port Philip) are examples and so are New York and Vancouver. Other ports have artificial harbours with stone breakwaters. Dover, Colombo, and Madras are examples. Some ports have no hinterlands, but they are needed as ports of call or coaling-stations. Aden is an example, Port Said another, Panama is a third.

Transport by Air. The great change in recent years has been the enormous increase in air traffic and transport. Between Britain and most of the countries of Europe mail is normally carried by air without additional charge. Letters sent by air mail to more distant areas reach their destinations in fewer days than formerly they took in months. In 1958 the number of passengers crossing the Atlantic by air exceeded for the first time the number crossing by sea. In countries of great extent, like the United States, air travel has largely replaced rail travel, indeed many railway lines are now operated only for freight. Most modern planes cruise at speeds of 200 to 300 miles an hour, jet aircraft reach double those speeds. As intercontinental aircraft increase in size, however, they can only use well-equipped airports with long runways—up to 2 miles long. Most countries aim to have a small number of such airports. On the other hand small aircraft can penetrate easily to remote places not served by road—as in the far north of Canada or the heart of Australia, Africa, and South America.

THE RACES OF MANKIND

We have now studied the occupations of man, but have said very little about the different races of mankind. In old geography books we find mankind divided into three races—the White, Yellow, and Black. But that was not a very good division, because the "White" or Caucasian Race includes nearly all the brown-skinned people of India. It is probable, too, that colour of the skin depends largely on exposure to the

sun. An Englishman in the tropics often becomes "tanned"—his skin becomes dark brown. His children, even though they are born in the tropics, are pale-skinned, but it is probable that if the white man lived for many generations in the tropics his skin would become much darker. We do find, indeed, that

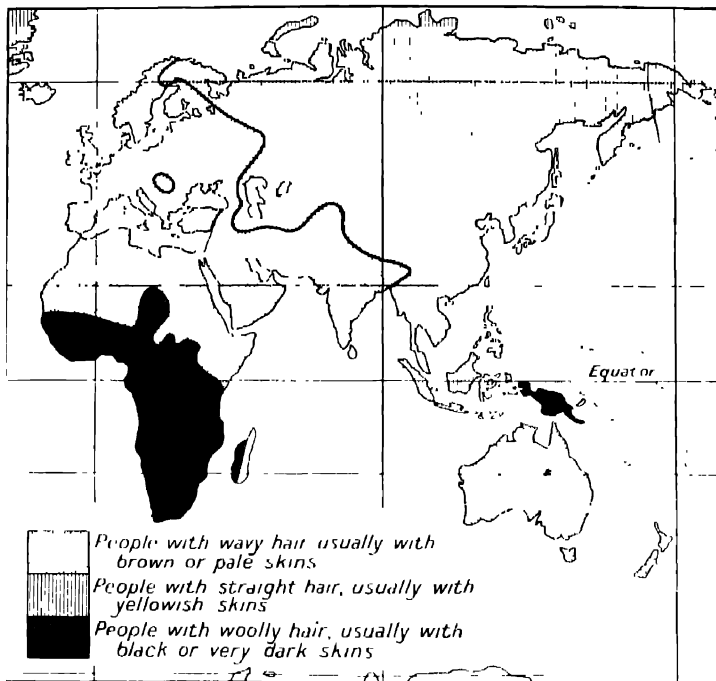


FIG. 114.—Peoples of the world.

America is not shown because it is mainly inhabited by people who have left Europe and settled there during the last 300 years. There are now very few "American Indians" who have straight hair.

the people of the south of Europe, such as the Italians, have a darker skin than those living in the north of Europe, where it is colder and there is less sun.

We can divide the races of mankind into three groups by their hair, though no such simple classification is really satisfactory. There are:

(1) People with straight hair. If we look at a section of

their hair under the microscope we find that the section is circular. These people often have yellowish skins and broad, flat faces. We may call them also "Mongolians." Some of them, like the Chinese, have dark almond-shaped eyes set obliquely. Most of the inhabitants of northern and eastern Asia are Mongolians. The American Indians who used to inhabit most of America have a coppery-red skin and straight hair, but they have larger noses than the normal Mongolians. The typical straight-haired people are the Chinese and Japanese.

(2) People with wavy hair. A section of their hair under the microscope is an oval. The wavy-haired peoples constitute the Indo-European division of mankind, including most of the inhabitants of Europe and India. Their skin varies from almost white to dark brown. They usually have narrower faces than the Mongolians and their noses are more pronounced.

(3) People with curly or woolly hair—hair which forms into tight curls all over their heads. Under the microscope their hair is seen to be flattened. The negroes belong to this group. They usually have very dark skins, almost black.

We shall learn more about the races of mankind when we deal with the separate continents.

QUESTIONS AND EXERCISES

1. What are the physical features, climate, and natural vegetation around your home? Mention all the ways in which your life is influenced by them.

2. Draw diagrams to show the cause of the rainfall in equatorial regions.

3. What do you understand by the term "climatic control"?

4. Give a general account of the chief wind systems of the earth.

5. How is rainfall measured? Draw a sketch-map expressing the annual rainfall of any country you know.

6. What connection is there between pressure and winds? Illustrate your answer by two sketch-maps showing the general arrangement of the pressure belts of the world during January and July and the resultant winds.

7. What is the meaning of "temperature"? What causes the differences in temperature (*a*) in a certain place at different times of the year; (*b*) in different places at the same time?

8. What is the difference between the two terms "climate" and "weather"? Give examples of each.

9. Show by means of sketch-maps how (a) temperature, (b) rainfall, have affected the natural vegetation of the earth.

10. Compare and contrast the equatorial and coniferous forests, dealing especially with the climatic conditions which have given rise to each.

11. What are the chief occupations of people who live in (a) steppes, (b) mountains, (c) savana land, (d) deciduous forests? Show how the geographical and climatic conditions have decided these occupations in each case.

12. Write an account of the meat trade of the world.

13. What geographical conditions (including climate) are necessary for the growth of (a) rice, (b) wheat, (c) cane sugar, (d) cotton, (e) maize?

14. What is an "industrial region"? Give a description of what you would expect to find in such a region.

15. Of what use to mankind are deserts? Show how deserts have formed boundaries between nations. Give examples.

16. Give a brief account of the world's production of woollen goods. Include in your answer the origin of the raw material, the places where this raw material is found, the industrial regions to which it is taken, and the process of manufacture.

PART II

REGIONAL GEOGRAPHY

EUROPE

POSITION AND SIZE

WITH the exception of Australia, Europe is the smallest of the continents. But it is the most densely populated, and is certainly one of the most important. The area of Europe is only 3,760,000 square miles, or little more than Australia. In comparison with its size, Europe has the longest coast-line of any of the continents; everywhere there are inland seas, deep bays and gulfs, so that no part of Europe is 1,000 miles from the sea. Compare this with Asia, where the centre of the continent is nearly 2,000 miles from the sea. Fig. E.1 is a map of Europe showing the important lines of the latitude and longitude. Europe is almost entirely in the North Temperate Zone; only a small piece in the north lies inside the Arctic Circle ($66\frac{1}{2}^{\circ}$ N.). Now notice the position of latitude 40° ; it cuts Spain and Portugal nearly in half, cuts off the "toe" of Italy, and passes through Greece; runs south of the Black Sea and through the Caspian. Note also that the British Isles lie between latitudes 50° and 60° . The all-important line of longitude, 0° , the meridian of Greenwich, passes, of course, through Greenwich, which is a part of London. Through the heart of Russia runs 40° E.

PHYSICAL FEATURES AND STRUCTURE

We can divide Europe quite simply into four parts, which are marked on Fig. E.2. Those four parts, or groups of units, are:

(a) The Ancient Earth Blocks of the north.

- (b) The Russian Platform.
- (c) The Great European Plain.
- (d) The Young Fold Mountains of the south, enclosing small plains and plateaus.



FIG. E.1.—The position and size of Europe.

Notice very carefully the position of the Arctic Circle cutting across the north of the continent, and of latitude 40° N., going right through the Mediterranean Sea. The capital cities of most of the countries are marked.

The Ancient Earth Blocks of the North. There are now in the north of Europe four masses, each consisting of ancient metamorphic rocks. Formerly these four masses were joined

and formed a great continent, but the work of marine denudation has been gradually to separate the parts. It is now possible to distinguish, as shown in Fig. E.2: (a) the largest mass, which is called Fennoscandia, comprising the countries of Norway, nearly all of Sweden, and Finland; (b) and (c) the northern parts of the British Isles—the Scottish Highlands and the hills of north-western Ireland, and (d) the island of Iceland.



FIG. E.2.—The main physical features of Europe.

In some cases, owing to their long exposure to the agents of denudation throughout the ages, these ancient masses have been worn down almost to sea-level; but in other areas, notably in Norway, they still stand up above sea-level as tracts of mountains. When the great mountain chains of the world were being built up by the Alpine earth movements these ancient blocks were hard and resistant, and, instead of being folded, they were badly cracked. Naturally, along the larger

cracks the rocks were crushed and powdered and more easily worn away by the agents of denudation, particularly by the sea. Notice from the atlas the very irregular coastline of Norway, and the numerous deep fiords which penetrate into the land. These fiords have been excavated along lines of crushed rock, formerly cracks. Also through some of the cracks in the ancient rocks masses of lava came up from the heated lower

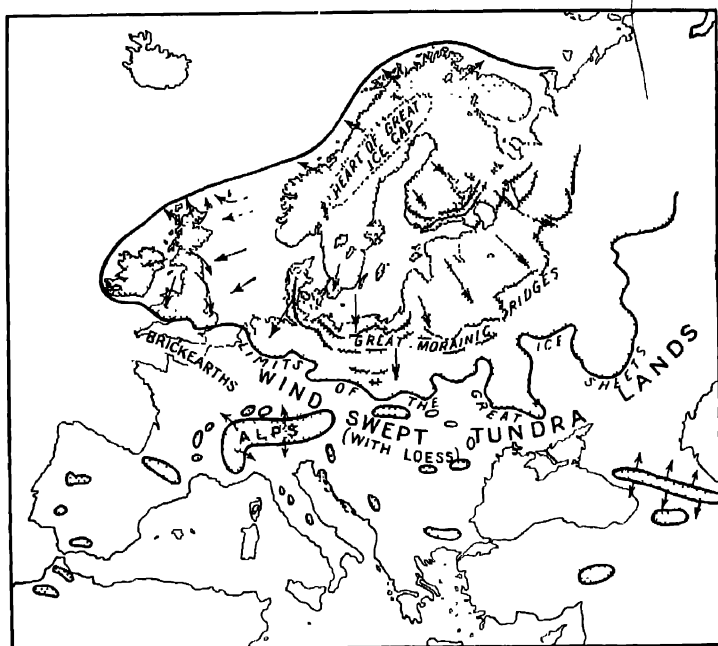


FIG. E.3.—Map of Europe showing the greatest extent of the ice sheets during the great Ice Age.

layers of the earth's crust and were poured out over the surface. Thus, in some areas there are large tracts of lava—as in the Plateau of Antrim in Northern Ireland, as well as over the greater part of the island of Iceland and much of the island of Skye off the coast of Scotland.

During the great Ice Age, which occurred comparatively recently in the earth's history, the higher parts of these ancient

blocks in northern Europe became centres of ice caps, and as the masses of ice increased so the ice moved southwards from the centres, smoothing the surface of the hard old rocks and carrying away the soil and loose rock which, when the ice later melted, was spread as a vast sheet over most of northern Europe. Fig. E.3 shows how far the main ice sheets extended. When the ice retreated—that is to say, when the ice melted—there were left behind great stretches of sand and clay and stones all over northern Europe, and when the ice sheets finally disappeared it was found that northern Scotland, Norway, Sweden, and Finland had very largely been swept bare of soil, the only soil remaining being around the lakes which had been formed in the hollows. So common are lakes as the result of the great Ice Age that the country of Finland is often called the “Country of Ten Thousand Lakes.” In all these ancient rocks there is, of course, neither coal nor oil. Sometimes there are metalliferous mineral deposits. In northern Sweden, for example, there are great masses of fine quality iron ore.

The Russian Platform. The Russian Platform is another area of ancient metamorphic rocks which occupies practically the whole of European Russia. But here the ancient rocks for a time sank below sea-level, and they were then covered by wide stretches of sandstone, limestone, and other rocks. The hard old rocks beneath prevented the sediments from being folded into mountains, and when the whole rose again above the level of the sea it formed an enormously wide plain over which the later rocks were practically unfolded. Again, a large part of the surface was covered during the great Ice Age by the ice sheet which had its centre over Fennoscandia. This also left behind glacial deposits over a great part of Russia. It is not difficult to imagine that to the south of the great ice sheet it must have been very cold. Bitterly cold winds would be blowing, bringing with them clouds of fine dust, just as one finds at the present day in the cold winters of the extreme north of China. A great part of this dust, known as *loess*, was deposited over the south of Russia and forms the material for the very deep soil of the steppe-lands which is so rich in

remains of vegetable matter that it is now almost black and so known as "black earth." This soil is very fertile and favours farming especially wheat-growing. Thus, the very ancient rocks of Russia are hidden from the surface and the overlying deposits of sand and other soft rocks have few minerals. To-day the whole lies at only a small height above sea-level and so forms a great plain. In some places, however, coal seams were formed amongst the sandstones which rest on the ancient rocks. European Russia has two great coalfields: one around Tula to the south of the capital, Moscow, and one farther south, in the Don Basin.

The Great European Plain. Lying to the south of the ancient blocks of the north, but at the same time north of the young folded rocks of the Alpine system, there is an enormous plain which is called on Fig. E.2 the Great European Plain. It is not, however, an absolutely flat surface such as the Indo-Gangetic Plain or the Amazon Lowlands, or even a gently rolling area. It is a plain in the broad sense, but its surface is broken up by a succession of hills and occasionally even by small mountain chains, though few exceed 1,000 or 2,000 feet above sea-level. Much of the Great European Plain, indeed, consists of land of the same character as we see in south-eastern England, for south-eastern England is really a part of the Great European Plain. The Plain stretches on the other side of the Channel through northern and western France, the whole of Belgium, Holland, northern Germany, Denmark, most of Poland, and in Russia it merges into the Russian Plain. At intervals throughout the plain there are what may be described as islands of older rocks which often rise to considerable heights above the general level. There are numerous examples of these old islands in Britain, such as the Southern Uplands of Scotland, the Lake District, the Pennines, Wales, and the South-western Peninsula. There is Brittany in France, the Ardennes of Belgium and the Harz Mountains and other hills in Germany. Some of these older islands include masses of granite and volcanic rocks, and occasionally are rich in metallic minerals. Many of the great coalfields of Europe occur on the flanks of these old islands amongst the

younger sedimentary rocks, and that is why there are considerable areas of concealed coalfields where the old rocks are covered by the younger. Surrounding the islands of old rocks are the stretches of younger sedimentary strata which usually give excellent soils for agriculture. There are frequently lines of hills, especially where limestone, including chalk, and sandstones crop out, while the valleys in between are formed of clays and sands and other rocks easily worn away by the agents of denudation. Then much of the surface of the lowland is covered by glacial deposits: sand, clay and loess. Some of the glacial sands form very poor soil and on them little can be grown. Some of the clay soils are not very good because they are difficult to drain and so are often covered with marshes, but the finer loess deposits form very good soil and are of great importance for agriculture. It is important to remember the variation in the surface deposits because similar conditions repeat themselves over most of the great European Plain.

The Young Fold Mountains. The Young Fold Mountains which occupy the greater part of southern Europe can best be understood by regarding them as forming a number of chains starting from a great central knot, the Alps. The Alps themselves form a curve from W.S.W. to E.N.E. The western end of the chain runs southwards and then eastwards and then south-eastwards into the Apennines and through the toe of Italy into Sicily. From Sicily to North Africa there is only a small gap, and the same line forms the important Atlas Mountains of North Africa. These mountains consist of two or more parallel ranges and one branch curves northwards, passing across the Strait of Gibraltar into Spain as the Sierra Nevada. From the western end of the Alps another branch runs westwards, but is soon cut off by the sea, to be continued later as the Pyrenees and the Cantabrian Mountains in the north of Spain. From the eastern end of the Alps there are really three main branches. One runs south-eastwards as the Dinaric Mountains into the Balkan Peninsula, where it divides. A second runs eastwards and is cut across by the Danube, only to be continued in a long curve like an "S" written backwards, forming the Carpathians, Transylvanian Alps, and the Balkan

Mountains. The third branch forms a small loop to the north, surrounding the plateau of Bohemia. Close to the Alps on the north-west lies a small range, the Jura, parallel to the main ranges of the Alps.

Now let us look at the plateaus, often of old hard rocks, which are enclosed by the fold mountains or lie just outside them. Nearly the whole of Spain is occupied by a high plateau called the Meseta. In the south of France lies the Central Plateau, west of the Alps. To the north of the Jura

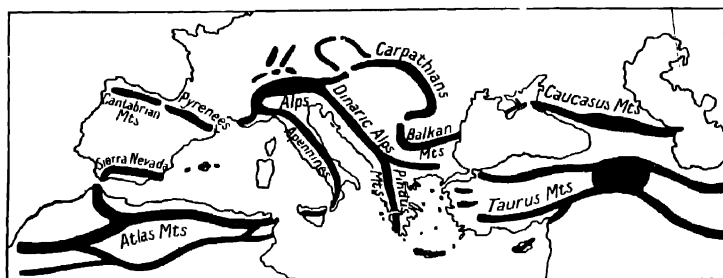


FIG. E 4.—The main mountain ranges of Europe.

are the blocks which form the Vosges and the Black Forest and farther north, the mountains on either side of the Rhine Gorge and the Ardennes. The Bohemian Plateau we have already mentioned. The islands of Sardinia and Corsica form the remnants of another plateau of old rocks.

The two most important plains enclosed by the mountain chains are the valley of the Po and the great Hungarian Plain.

The Rivers of Europe. Europe has many rivers; most of them are small, but they are important because they are of great use to the busy industrial countries through which they flow. We may separate the larger rivers into three groups:

(a) Rivers flowing northwards from the fold ranges to the sea on the north side of the mountains.

(b) Rivers on the south side of the mountains.

(c) The rivers of Russia.

Rivers flowing Westwards and Northwards.—In France the most notable are the Loire and the Seine; in Germany, the

Rhine and the Elbe which enter the North Sea; farther east (in Poland) the Oder and the Vistula enter the Baltic.

Rivers to the South of the Mountains.—This group includes the rivers of Spain and Portugal—the Douro, Tagus, Guadiana, and Guadalquivir emptying into the Atlantic Ocean, and the Ebro into the Mediterranean. In France is the Rhone, and in Italy the Po. One of the most important rivers of Europe is the Danube, which rises to the north of the Alps but which flows east-south-eastwards, cutting through three important ranges before it reaches the Black Sea.

The Rivers of Russia. The longest river in Europe is the Volga, which does not enter the ocean but flows into the largest salt lake in the world—the Caspian Sea. The greater part of European Russia lies in the basin of the Volga. In South Russia are the Dnieper and the Don, flowing into the Black Sea: in North Russia, the Western Dwina and the Northern Dwina.

THE MINERALS OF EUROPE

The occurrence of minerals of economic value in Europe is naturally very closely connected with the physical features and structure of the continent. The situation of the coalfields is shown in Fig. E.5 and it is clear from this map that all the big ones are in the Great European Plain—in France, Belgium, Holland, Germany, Poland and Russia. There are practically no coalfields in southern Europe.

Europe is not rich in *oil* except in Russia and Rumania. Many of the countries or regions which have little or no coal or oil are, however, rich in *water power*. Naturally, water power is most important in those countries with high mountains from which the water flows down from a great height and which have, at the same time, a heavy rainfall or a rainfall well distributed throughout the year. Thus, water power is very important amongst the mountains of northern Europe—Norway and Sweden—and the mountains of southern and central Europe, particularly the Pyrenees, the Alps, the Apennines and the Carpathians. The map (Fig. E.6) shows by means of triangles the places where water power is most important.

Iron ore is widely distributed in Europe, and there are some big masses of very good quality ore amongst the ancient rocks, particularly in northern Spain and in northern Sweden; but elsewhere there are also large beds of iron ore, not of such good quality, but important because of their wide extent and the ease with which the ore can be mined. Such beds are found in many parts of the north European Plain, including, in Britain, the Cleveland Hills of Yorkshire and the Midlands, especially

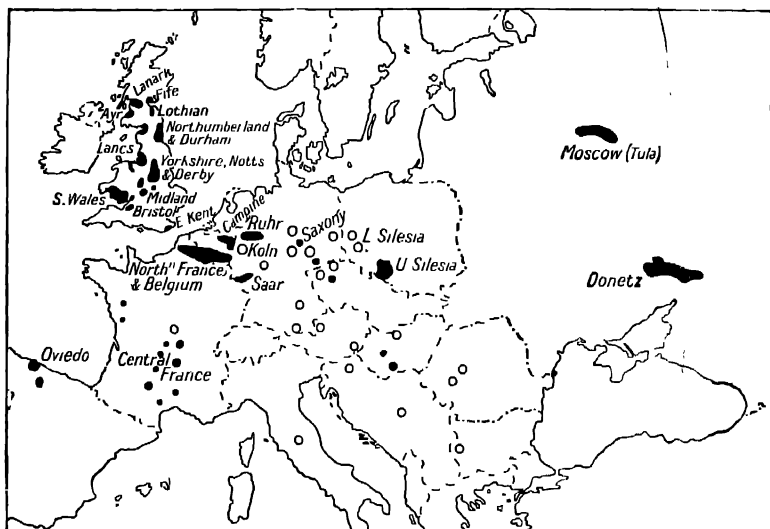


FIG. E.5.—The coalfields of Europe.

Solid black areas or dots show fields of ordinary or bituminous coal; circles indicate the principal lignite or brown coalfields

in Northamptonshire and Lincolnshire. There are also huge deposits in the Lorraine district in north-eastern France; these deposits stretch over the border into the small state of Luxembourg and into Belgium.

Since both iron ore and coal are bulky commodities and expensive to transport in large quantities, iron and steel are usually made where these raw materials are available. About half of all the iron and steel in the world is made in the United States, but the other five principal iron and steel

making countries are in Europe. They are Britain, Germany, France, Russia, and Belgium. Notice from the coalfield map that these are all countries having good reserves of coal.

The other minerals of Europe are less important. Some of the old rocks of the plateaus, particularly in Spain, are

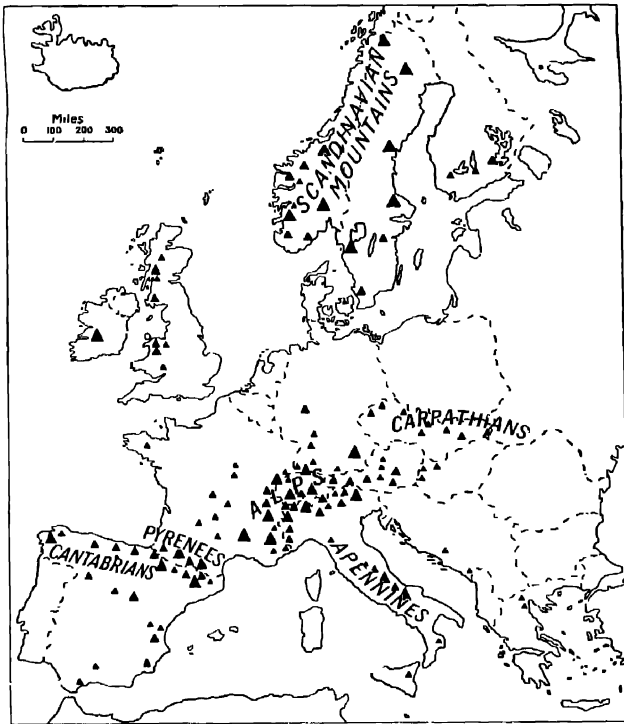


FIG. E.6.—Water-power in Europe.

The triangles show the principal hydro-electric installations. Notice how closely they are connected with the main mountain ranges

rich in copper, lead, silver, and other metallic ores, and similar ores, together with zinc, are also mined in Germany.

The Relationship of the Countries of Europe to the Physical Features. It is possible to group the countries of Europe as follows:

(1) The lands that belong to the region of the old mountain blocks in the north. These are northern Scotland, the whole of Norway, most of Sweden and the republic of Finland. We shall not expect to find any coal or oil in these countries, nor their soil to be very good for agriculture except in small patches, but in places we shall expect them to be rich in metallic minerals.

(2) The lands of the Great European Plain, including England and Wales and southern Scotland, most of France, the whole of Belgium, Holland, and Denmark, the greater part of Germany (*i.e.* all northern Germany) and nearly all of Poland. We should expect all these countries to have much low land suitable for settlement by large numbers of people, and all the areas of richer soil to form good agricultural land, and that is the case. In this tract, as shown in Fig. E.5, are the chief coalfields of Europe. Most of the great industrial regions are situated on or around these coalfields.

(3) U.S.S.R. Russia, now including the small Baltic countries of Estonia, Latvia and Lithuania, stands by itself on the Russian Platform.

(4) The countries of the mountain belt of southern Europe. Later we shall notice that this tract falls into two parts according to climate: the part which has the climatic conditions of central and north-western Europe and the part which has the climate of Mediterranean Europe. Let us for the present notice that the lands lying amongst the folded mountains are Portugal and Spain, the southern part of France, the countries of central Europe which have no coastline (Switzerland, Austria, Czechoslovakia and Hungary), and the countries of Italy, Yugoslavia, Albania, Greece, Bulgaria, Rumania and the tiny European fragment of Turkey.

CLIMATE

Conditions in the Winter. To understand conditions in Europe in the cold season we must remember what we have learnt of the regular wind systems of the globe. At this season the sun is shining vertically south of the equator, and the pressure systems are south of their average position. Europe

then lies in the belt of the South-Westerlies, and western Europe enjoys the mild, moisture-laden winds from the Atlantic Ocean. The western coasts of the continent are also bathed by a warm current—the North Atlantic Drift—which is a continuation of the Gulf Stream. The western part of the continent has thus both warm winds and warm air from over the currents. The eastern part of the continent, on the other

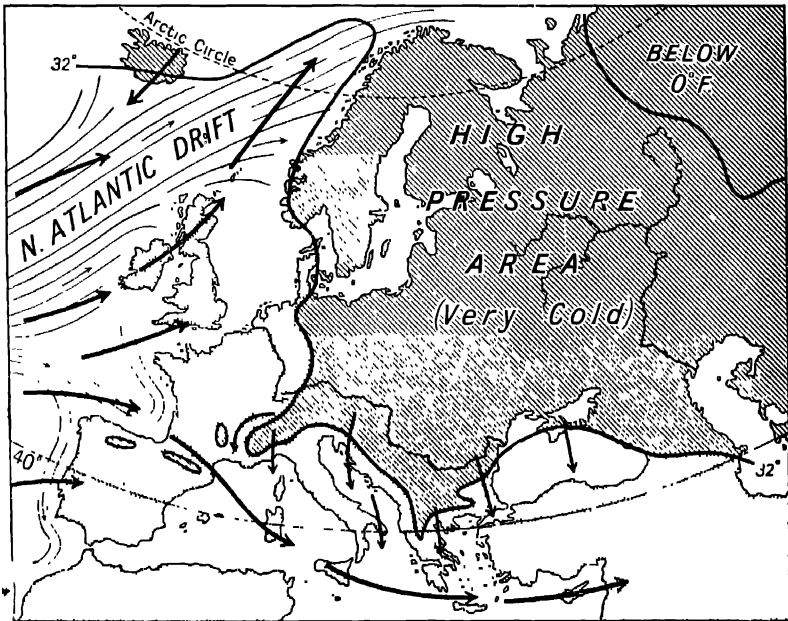


FIG. E.7.—Climatic conditions—winter. Average surface temperatures are shown, *not* sea-level isotherms.

hand, is a long way from the Atlantic Ocean and is very near the great land mass of Central Asia, which, in the winter season, gets very, very cold. So we find that in Europe in the cold season it gets colder and colder as we travel from west to east. As the rain-bearing winds come from the west, the west gets more rain than the east; rain is especially heavy where there are mountain ranges to intercept the winds. Between the mass of cold heavy air over northern and eastern Europe and the

mass of mild moist air from the west is a very important "front" along which many disturbances develop.

Conditions in the Summer. At this season of the year the sun is shining vertically over the Tropic of Cancer—that is, over the north of Africa and only a little to the south of Europe. The wind systems of the world have moved to the north, and so only the northern part of Europe is under the influence of the

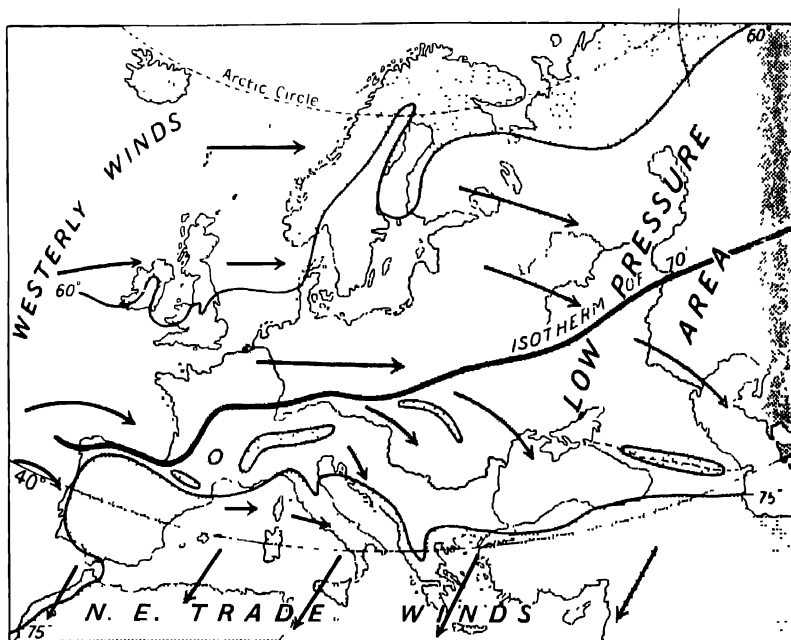


FIG. E.8.—Climatic conditions—summer. Average surface temperatures.

South-Westerlies. The southern part of Europe—namely, the countries surrounding the Mediterranean Sea—lie within the high-pressure belt which surrounds the globe just outside the Tropics. It is from this high-pressure belt that the North-East Trade Winds start. In the hot season, then, the Mediterranean lands do not receive any cooling or rain-bearing winds from the Atlantic Ocean. Instead, the countries get very hot and have little or no rain. Summarising, we see that

the countries in the south of Europe have a wet, warm winter when the moist South-Westerlies are blowing, and a hot, dry summer. This is the typical "Mediterranean Climate," or Winter Rain Climate. It should be noted that in the east of the Mediterranean the winters become colder and the summers hotter.

If we look at the temperature of the rest of Europe in the

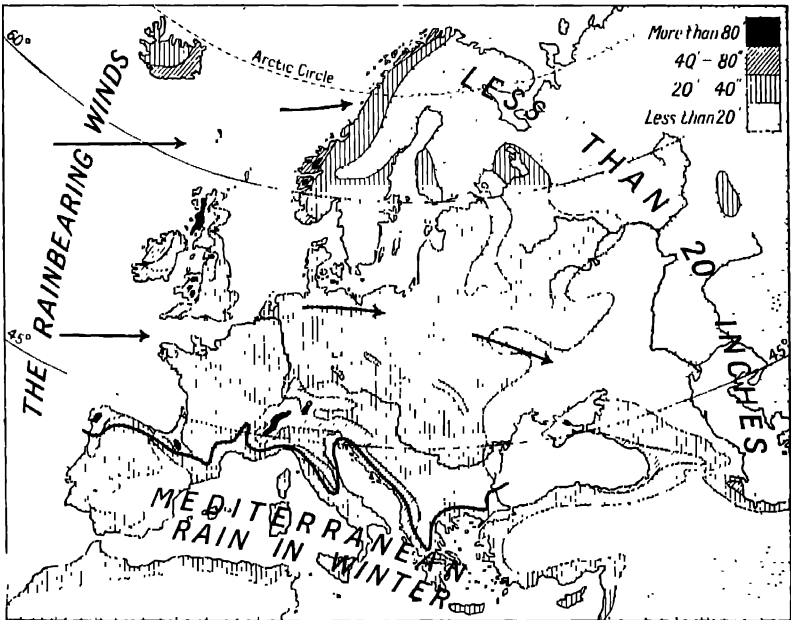


FIG. E.9.—Rainfall map of Europe for the whole year.

The thick black line separates the winter rain region from the rain all the year region

summer we see that it gradually gets cooler and cooler as we go northwards (Fig. E.8). This is quite different from what we found in the winter. Since northern Europe is under the influence of the South-Westerly Winds all the year, so rain falls all the year. But the Westerly Winds do not blow as regularly as the Trade Winds. Instead there is often a succession, moving in general from west to east, of depressions or "lows" and wedges of high pressure. Rain falls mainly when a

depression is passing over or, more strictly, a "front" between air-masses of different types.

Climates of Europe. Five of the great climatic regions of the world are represented in Europe. These are:

- (a) The Mediterranean.
- (b) The Cool Temperate Oceanic.
- (c) The Temperate Continental or Mid-latitude Grassland.
- (d) The Cold Temperate or Coniferous Forest.
- (e) The Tundra or Arctic.

(a) *The Mediterranean Climate.* This climate, with its hot dry summers and warm damp winters, is found over the southern part of Portugal, coastal Spain, southern France, the southern two-thirds of Italy, coastal Yugoslavia and Greece. In the winter most of the rain-bearing winds come from the west and so usually the western side of each land mass has the greater rainfall. The plateau of Spain has cold winters because of its height, and is not typically Mediterranean.

(b) *The Cool Temperate Oceanic Climate* has rain all the year round, and is found all over north-western Europe, but we can distinguish the three sub-divisions shown on Fig. E.10. The countries with a relatively mild winter are the British Isles, the greater part of France, Belgium, Holland and south-western Norway; the countries of central Europe which have a colder winter are most of Germany, eastern Denmark, southern Sweden, Poland, and those countries of central Europe which have no coast-line. The eastern European climate with its very cold winters is found in central Russia.

(c) *The Temperate Continental, or Mid-latitude Grassland Climate,* is the climate of the steppes and is found in those great grasslands in southern Russia and also in the Hungarian plain. Where the rainfall is very low, as around the Caspian Sea, the grasslands fade first into very dry steppe lands and then into desert.

(d) *The Cold Temperate Climate,* the climate of the great coniferous or softwooded forests, where it is really too cold for most types of farming is found in Norway, the northern two-thirds of Sweden, Finland and the north of Russia, and

in all these countries the activities of the people are really very similar.

(e) *The Tundra, Cold Desert or Arctic Climate*, is found in the high mountains of Norway and Sweden and the northernmost parts of Finland and Russia.

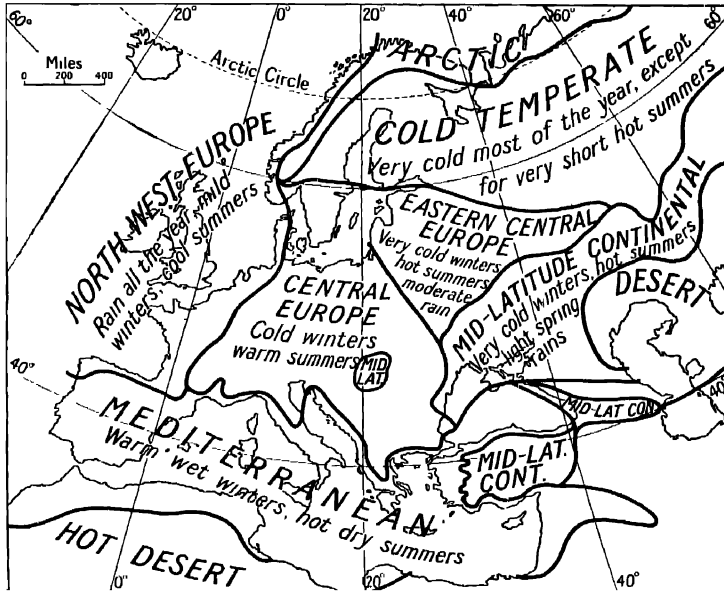


FIG. E.10.—Europe: climatic regions.

VEGETATION

Many of the countries of Europe are very thickly populated, and the natural vegetation has been removed by man over large areas, especially in the British Isles, France, and Germany. But it is still possible to distinguish natural vegetation regions, and they have been indicated in Fig. E.11. It will be noticed that the vegetation belts on this map coincide almost exactly with the climatic divisions shown in the previous figure, except for the occurrence of belts of softwooded coniferous trees, like those of the northern coniferous forests, on the mountains of Central Europe.

The forests of Europe yield various timbers which are required by man. Softwood timbers are obtained from the coniferous trees, and the hard woods from the deciduous trees. Thus it is possible to see from the natural vegetation map those countries of Europe which have large quantities of softwood timber. They will naturally be the countries of the north—Norway, Sweden, Finland, and northern Russia—which share

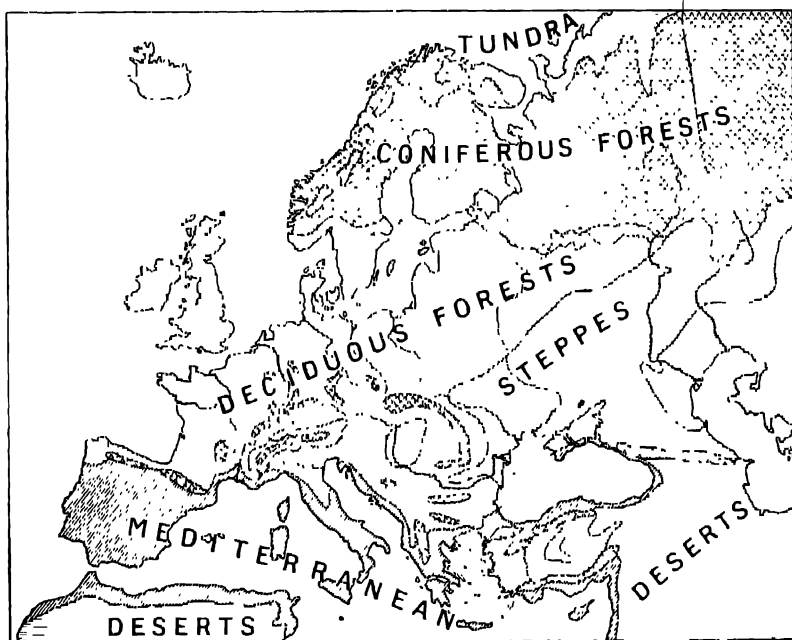


FIG. E.11.— Vegetation map of Europe.

in the great belt of the northern coniferous forests. We find that each of these countries exports timber. Then the countries of central Europe which share in the great mountain belt also have good coniferous forests on the slopes of the mountains, and many of these countries are also exporters of timber. Coniferous forests can grow on poorer soils than deciduous forests and so we find plantations on the sandy lands of the European Plain. Thus France and Germany can grow

practically enough timber for their own use. The countries of Mediterranean Europe, however, and the British Isles have to buy timber from abroad.

AGRICULTURE IN EUROPE

Although not a very large area, Europe is divided into a large number of political units, and it will make our study of the geography of the separate countries much easier if we first learn something about farming in the continent as a whole. There are certain features which apply to all the countries:

(1) No European country can produce all the food or raw material which it requires, for the very simple reason that Europe is a continent entirely in the temperate zone, so that any crop which requires a tropical or equatorial climate cannot be grown in Europe. All European countries have to buy such commodities as rubber, cocoa, coffee, tea, cane-sugar, rice, and many other foodstuffs and raw materials.

(2) In most countries only a small proportion of the people are farmers, the larger proportion being engaged in manufacturing industries; in such countries it is not, as a rule, possible to grow sufficient food for the people's requirements. This is so in England, Wales, and Scotland, and many other European countries have to buy a large proportion of foodstuffs which they require from overseas. This is not true, of course, of the great territory of the U.S.S.R., where there are huge areas growing wheat and other food grains.

(3) Since it is not possible for most European countries to grow all the foodstuffs they require, the farmers usually specialize in those crops, or in producing those agricultural commodities, for which the climate, soil, and other conditions are most suited. Sometimes few crops will be grown, but cattle will be kept for the sake of their milk. It is difficult to send fresh milk for great distances or keep it for a great length of time, and so the milk which is required is, for the most part, produced as near as possible to the homes of the people. Thus dairy farming is an important occupation in most of the countries of Europe. In the accompanying maps we have shown the distribution of some of the leading crops. When

studying the conditions which tend to limit their cultivation, we may group the countries as follows:

(a) *The Mediterranean Countries.* In the Mediterranean countries of Europe the olive tree, from the fruit of which olive oil is obtained, is particularly important notably in Spain, southern France, and Italy. With it are many of the well-known Mediterranean fruits, including the vine, from whose

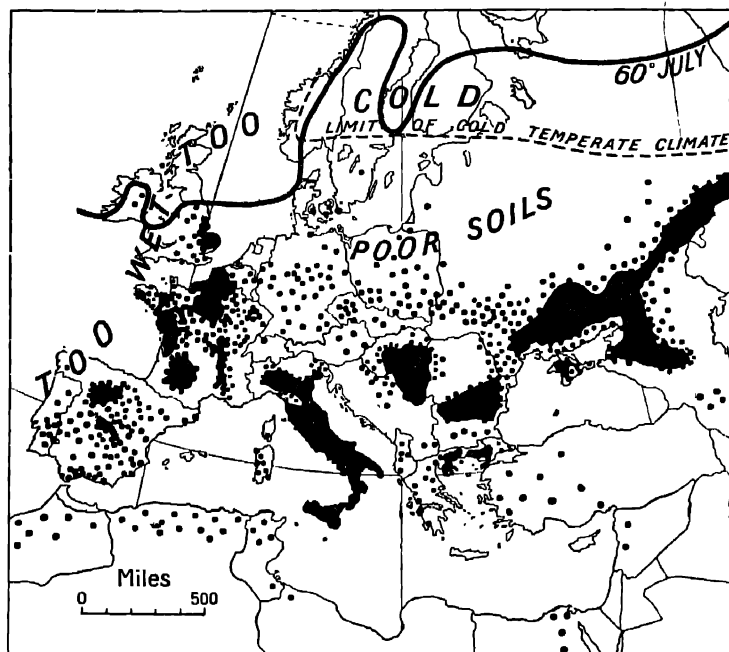


FIG. E.12.—The wheat lands of Europe.

grapes wine is made. Very large quantities of wine are made in France, Italy, and Spain, as well as in the north of Africa on the other side of the Mediterranean. Oranges are often important, as they are in Italy and parts of Spain, whilst in one European island, the island of Sicily, there are districts very famous for lemons. The chief grain crops grown in Mediterranean lands are wheat and barley, but the hot, dry summers of Mediterranean countries do not favour the

growth of oats, and these lands are usually too dry in summer for maize. On Mediterranean hill-sides sheep may be kept but they do not, as a rule, yield either wool or mutton of particularly good quality. In many of the drier parts goats are more important. The larger animals include mules and asses, which are often more important than horses.

(b) *Countries of North-Western and Central Europe.* In the wetter and cooler parts of these lands the grain which will

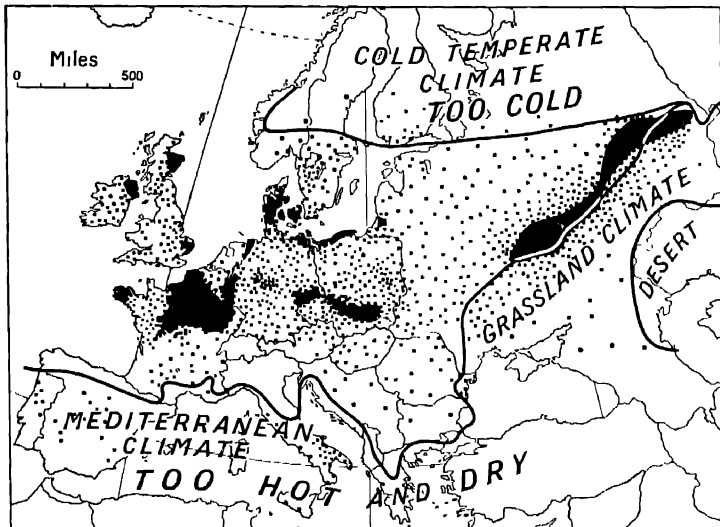


FIG. E.13.—The oat-growing countries of Europe.

ripen best is oats. Large quantities of oats are thus grown in the British Isles. On the better soils where there are drier and sunnier conditions wheat grows well. On the mainland of Europe, where the soil is not good enough for wheat, rye takes its place and is used for the making of bread. Maize will only grow where there is plenty of moisture and the summers are warmer, as they are in central Europe. A very useful crop which will often grow on the poorest lands is potatoes. They are very important over nearly the whole of the north European Plain. On the damp pastures there are nearly

always large numbers of cattle. Sheep are most numerous on the drier hills or on hills in wet regions where there is good drainage. The vine flourishes in the warmest parts.

(c) *The Steppelands of Southern Russia* are the regions where enormous quantities of spring wheat are grown, as well as barley and some rye.

(d) *The Countries of Northern Europe*. These countries are too cold for very much agriculture. Barley is a crop

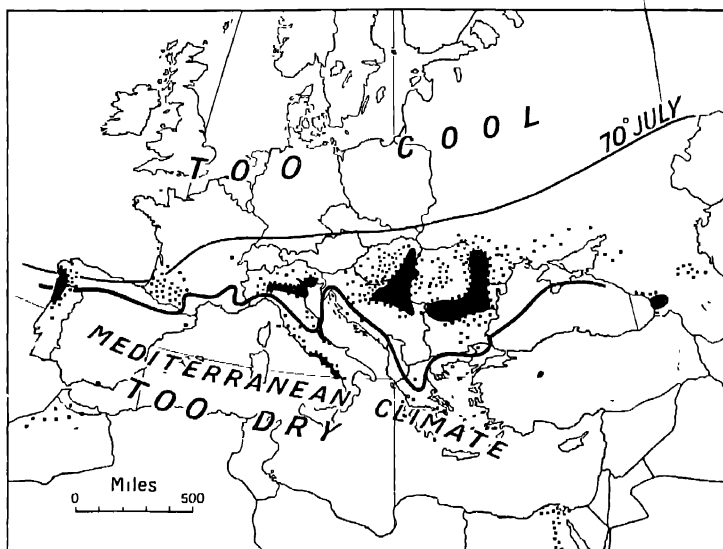


FIG. E.14.—The maize-growing countries of Europe.

which can take advantage of the long summer days and will ripen even far within the Arctic Circle. Potatoes can be grown, and the keeping of dairy cattle is important, for the grass can be grown in summer, and cut and dried as hay for use in the winter, when the cattle are kept in stalls.

POPULATION

Except in the extreme north or in parts of Russia in the south-east, Europe is inhabited entirely by peoples of the white or Indo-European race. There are three main divisions:

The people of the north—the Nordics—tend to be tall, pale-coloured, frequently with light hair and blue eyes.

The people of the south—the Mediterranean peoples—have darker skins, are not so tall, and usually have darker hair and eyes.

Between these two, in Russia and Central Europe, we find the Alpine peoples—with broad flat faces and heads which are short from back to front.

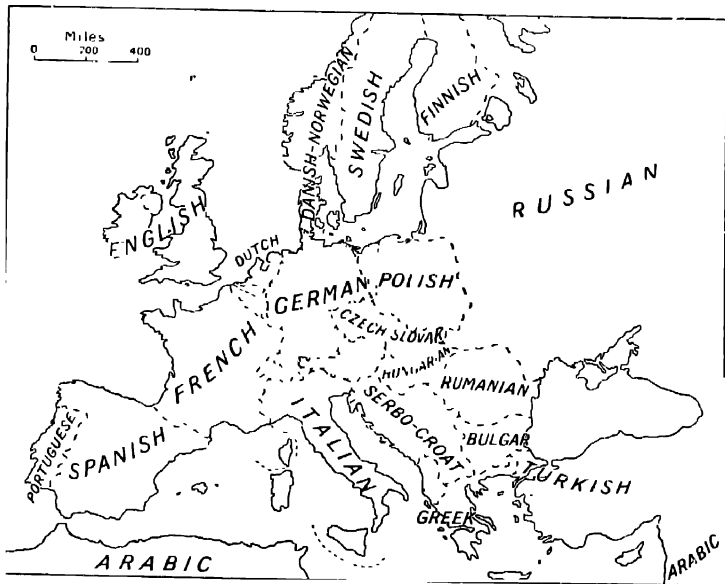


FIG. E.15 —A map showing the chief languages of Europe

In the south-east of Europe, on the fringe of the grasslands of Hungary, are Mongolian peoples, including the Magyars of Hungary, and the Cossacks of Russia. There is also the distinction in Europe provided by language. Many of the great political units have, of course, their own language: the people of France speaking French, the people of Spain Spanish, the people of Germany German, and so on; but there are several European countries which have no distinctive language of their own. There is, for example, no Swiss

language nor Austrian language. The map (Fig. E.15) shows the chief languages which are spoken in Europe. In Czechoslovakia, Czech and Slovak are the native languages, but German is widely understood. The people of southern Belgium speak French, the people of northern Belgium a language almost the same as Dutch.

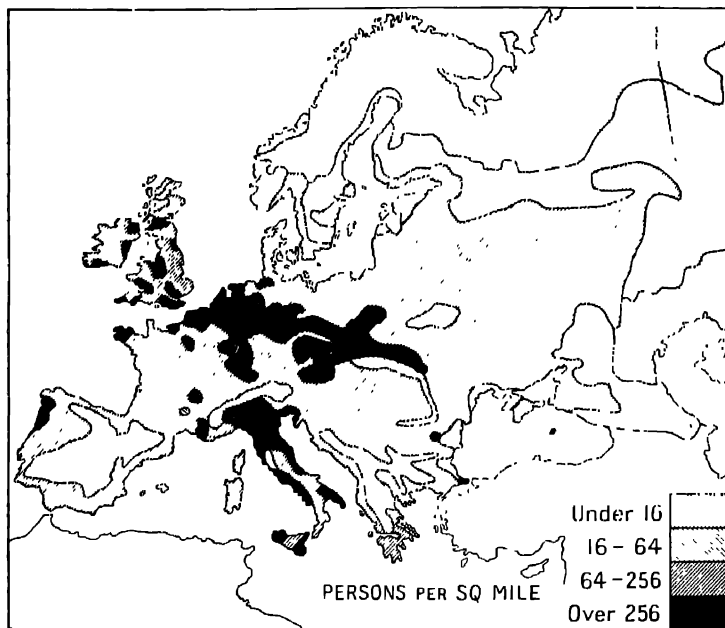


FIG E 16.—Population of Europe.

The black areas are mainly manufacturing areas, the tracts with between 64 and 256 people to the square mile include the *best* farming land.

When we come to study the geography of the countries of Europe we must remember the changes which have taken place as a result of the two World Wars. Several of the countries of central Europe—Czechoslovakia, Yugoslavia and Poland—came into separate existence in 1918 or 1919 after the break up of the Austro-Hungarian Empire and the Russian Empire, though Poland had been an important independent country before 1815. In 1938 the Germans under Hitler seized Austria

and parts of Czechoslovakia; in 1939 they seized the remainder of Czechoslovakia and invaded Poland whereupon Britain declared war. Russia occupied the eastern part of Poland and part has since been added to Russian territory. The Baltic republics of Estonia, Latvia and Lithuania, independent from 1919 to 1940, joined the Russian Union after occupation by Russian forces in 1940. As a result of the war between Finland and Russia in 1939-1940 some formerly Finnish territory passed to Russia. In 1941 Germany attacked Russia and, until the final defeat of Germany and her partner Italy in 1945 by Britain, the United States, Russia and their allies, much of Europe, from France to the Balkans, was ruled by German troops. Although the European war came to an end in 1945, some problems still remained to be settled in 1959—notably the continued division of Germany.

It is a very valuable exercise to make a list of the countries of Europe and record the chief details about them under the following headings:

- (a) Name of country.
- (b) Type of government.
- (c) Major physical region of Europe in which situated.
- (d) Type of climate.
- (e) Whether possessing coalfields, water power, or various minerals.
- (f) Language spoken.

QUESTIONS AND EXERCISES

1. What geographical factors have helped Europe to become the most important of all the continents?

2. Construct a sketch-map of Europe to show the distribution of the chief races of people.

3. In what natural vegetation belts do the following countries lie: England, Norway, Belgium, Hungary, Italy, South Russia, and Switzerland?

4. What distinct types of climate are found in Europe? Give a brief description of each type, stating where they are found.

5. Compare and contrast the climates of western Europe with those of eastern Europe.

6. What parts of southern Europe may be said to possess a Mediterranean climate? Give reasons for the limits you adopt.

THE BRITISH ISLES

THE British Isles comprise the large island of Great Britain, the island of Ireland, and a large number of smaller ones. Great Britain is still divided into England, Wales, and Scotland for certain purposes, though the three have been united under one king since 1603. Since 1920 Ireland has been divided into "Northern Ireland" and Southern Ireland, officially known as the "Irish Republic." Northern Ireland has a parliament of its own, but is otherwise very closely linked with Great Britain. The Irish Republic, on the other hand, is independent of Great Britain, and has a president of its own.

Care must be exercised in using the term "United Kingdom." Before 1920 the United Kingdom referred to the whole of the British Isles; it now refers to the "United Kingdom of Great Britain and Northern Ireland." Included for most purposes in the United Kingdom are the Isle of Man and the Channel Isles, which are, however, not part of England, Wales, or Scotland.

The following table, for reference purposes, gives the area and population of the British Isles:—

	Area, square miles	Population (Census, 1951)	Density per square mile
England	50,874	41,147,938	750
Wales	7,466	2,596,986	167
Scotland	30,405	5,095,969	159
Isle of Man	221	55,213	250
Channel Isles	75	102,770	1,369
<i>Total, Great Britain</i> .	89,041	48,840,893 ¹	550
Northern Ireland . . .	5,237	1,369,579	258
<i>Total, United Kingdom</i>	94,278	50,210,472 ¹	534
Irish Republic	26,601	2,958,878	111
<i>Total, British Isles.</i> .	120,879	53,327,333	441

Excluding Isle of Man and Channel Isles.

POSITION

The British Isles, as suggested by Fig. E.1, lie mainly within the rectangle formed by the two lines of longitude 0° and 10° West and the two lines of latitude 50° North and 60° North. Lying off the north-western shores of Europe the British Isles were, in the great days of Greece and Rome, on the fringe of the known world. Indeed, so long as the lands round the Mediterranean Sea remained the focus of the



FIG. B.1.—The world position of the British Isles.
London the centre of the land hemisphere

world's life and commerce, the British Isles were in a geographically unfavourable position. The discovery of America and the rapid growth in importance of the lands on the western side of the Atlantic revolutionised the importance of Britain's geographical position. Britain lies in the centre of the land hemisphere; her climate is kept genial and her ports always free from ice by the influence of the North Atlantic Drift; she faces the most important and most developed parts of America on the one hand and the mouths of the most important rivers of Europe on the other. There is no doubt that the central geographical position of Britain in the modern world is an important factor in her prosperity.

The advantages accruing to the British Isles by virtue of their world position have been greatly enhanced by the character of the seas surrounding the islands. Fig. B.2 shows the extensive shelf round the British Isles, which not only affords valuable fishing grounds but renders more marked the rise

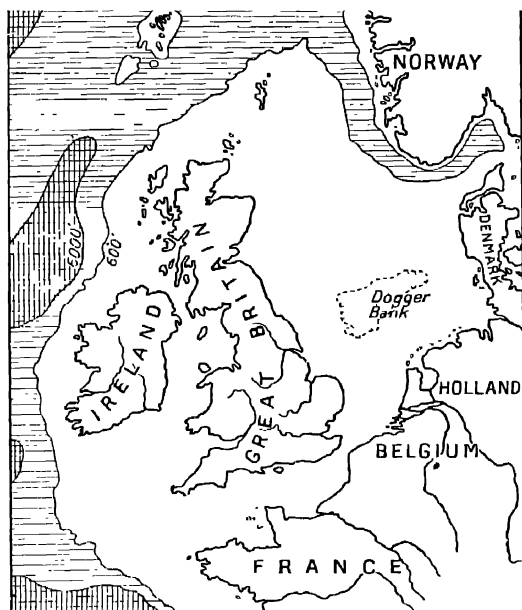


FIG. B.2.—The continental shelf or extension of the continental land mass as a shelf under the shallow seas round the British Isles.

All parts of the seas shown in white are less than 600 feet deep. The Dogger Bank is covered by less than 100 feet of water.

and fall of the tides. Tidal scour round the island is responsible for the absence of river deltas and also for the comparative absence of silting in many of the ports.

PHYSICAL FEATURES

It will be remembered that the Highlands of Scotland and the highlands of Northern Ireland belong to the group of ancient plateaus in Northern Europe. Although the highest

points in the British Isles are found in the Scottish Highlands their general elevation is insignificant when compared with that of the Scandinavian massif. Ben Nevis, slightly over 4,400 feet, is the highest mountain in the British Isles. Excluding the Scottish Highlands and corresponding parts of Northern Ireland, the whole of the British Isles may be said to form part of the Great European Plain from which they are separated by the narrow Strait of Dover and the shallow North Sea. Like the European Plain, the surface is varied, few parts are really flat, there are ranges of hills and even of mountains. But the greatest elevation reached in England and Wales is less than 4,000 feet. Fig. B.3 is intended to show that low hills of 500 feet and over are widespread throughout the British Isles, but that there is comparatively little land over even 1,000 feet in England or Ireland, and that large parts of the more mountainous Scotland and Wales are also below this elevation.

The main physical features of the British Isles, like those of most countries, are due to the underlying geology. Where the rocks are hard or resistant to weathering they form hill masses; where they are soft or more easily worn away by rain, rivers and other agents of denudation we find valleys and plains. On the whole the older the rocks the more resistant they are, whereas rocks which the geologist calls young are often sands, clays and muds much more easily eroded away.

We find we can divide the island of Great Britain roughly into two halves by an irregular line running from the mouth of the Exe in the south-west to the mouth of the Tees in the north-east. The part of the north and west is *Highland Britain*, the part to the south and east is *Lowland Britain*. Highland Britain consists mainly but not entirely of mountains and uplands. There most of the people live in the valleys and plains and may be separated from their neighbours by wide stretches of uninhabited moorland. Lowland Britain on the other hand, though not a flat plain, has few hills which reach as high as 1,000 feet. There most of the land has been settled and cultivated and there is very little moorland.

- Taking *Highland Britain* first we find that Scotland falls into three divisions.

The *Highlands* form a great dissected plateau occupying the northern half of Scotland, divided into two halves by the deep

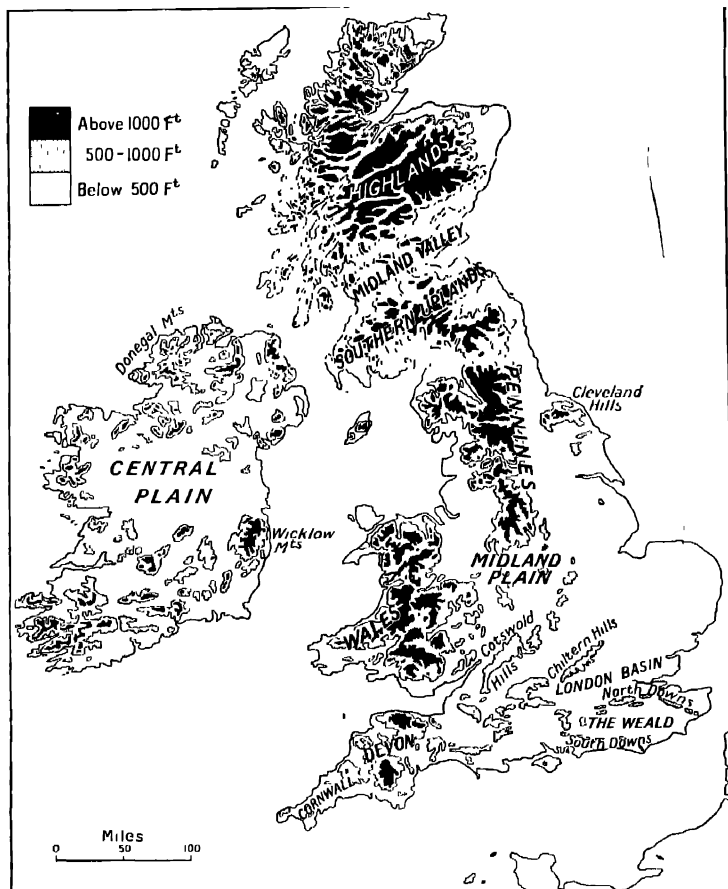


FIG. B.3.—Physical map of the British Isles.

This map should be studied carefully in connection with Fig. B.4. It will be found that each of the important areas of highland shown on this physical map corresponds with one of the main physical regions. Also compare this map with the population map, Fig. B.22, and it will be noticed that nearly all the highland areas are thinly populated.

trench of Glen More, separating the North-West Highlands from the Grampians. The scenery of the plateau in due in

large measure to ice action during the Great Ice Age. The west coast is a typical fiorded coast with wild rocky scenery. The fiords of Scotland, like those of Norway, are deep, steep-



FIG. B 4.—The main physical divisions of the British Isles

sided inlets of the sea, often marked by sharp, almost right-angled bends and by a submerged ridge near the mouth. They are generally believed to have been excavated by tongues of ice working along lines of weakness caused by two sets of great

cracks at right angles or cracks radiating from several centres about which there are also concentric cracks.

The Southern Uplands are formed by a broad low fold range running with a north-east to south-west trend (Caledonian trend) across the south.

The Midland Valley, the most important part of Scotland, lies between the Highlands and the Southern Uplands.

In England and Wales there are four chief areas of highland.

The Lake District of the north (Cumbrian Mountains).

Wales, consisting of very old rocks in the north (Cambrian Mountains), but with a great coal basin in the south (South Wales Coalfield).

Devon and Cornwall, occupying the peninsula of the south-west.

Then running down the centre of the north of England are the *Pennines*. Part of the great Midland Plain wraps round the southern end of the Pennines and separates them from the other hill masses.

Lowland Britain we shall describe in more detail later but we find there an extensive *Midland Plain* with branches into Lancashire on one side of the Pennines and into Yorkshire on the other. To the south-east are the Scarplands, consisting of low ridges running from south-west to north-east, marking the outcrops of successive beds of harder rocks, separated by parallel valleys along the outcrops of the softer clays. In the extreme south-east is an arch or anticline running from east to west (the Weald), whilst London lies in a syncline (London Basin).

Coastline. The British Isles have a very long coastline, for the coasts are very deeply indented and no part of the islands is as much as a hundred miles from the sea. The numerous inlets afford excellent harbours and have permitted the growth of great ports, especially as many of the inlets penetrate rich and fertile parts of the country and there are no mountain barriers to hinder communication with the interior. Openings like the Firth of Clyde and Firth of Forth in Scotland; the mouths of the Tyne, Wear, Tees, Humber, and Thames on the east coast of England; Southampton

Water and Plymouth Sound on the south; and the Bristol Channel and mouth of the Mersey on the west may be noted as inlets having a special importance. In some cases the

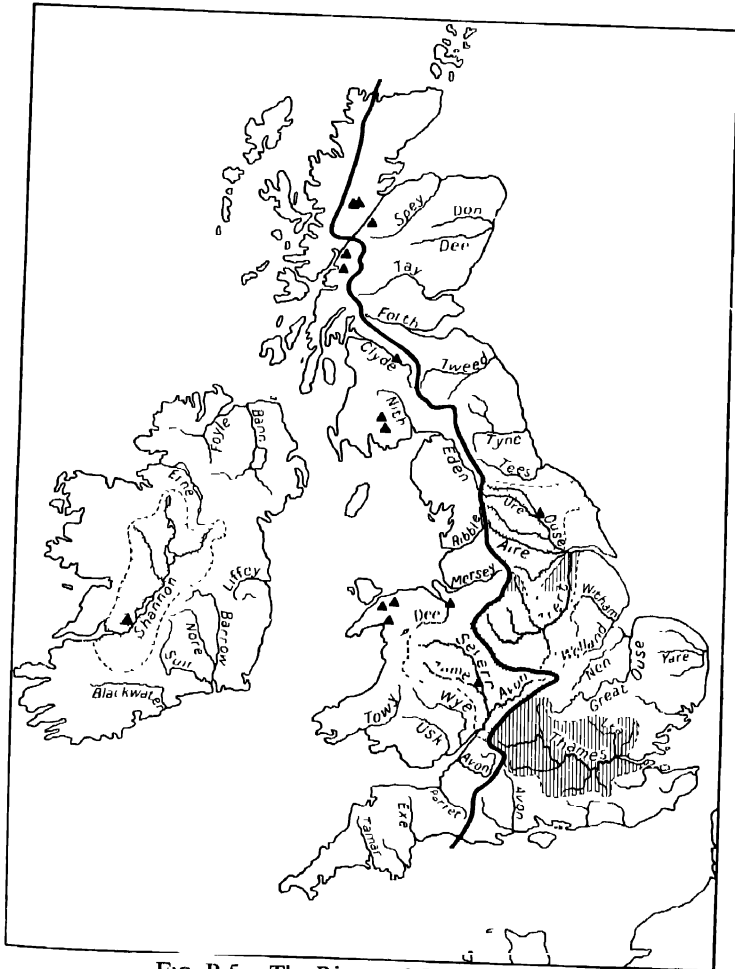


FIG. B.5.—The Rivers of Great Britain.

Compare this map with Fig. B.3 and notice that since the highland areas of Great Britain are mainly towards the west, the longest and most important rivers are usually those flowing from the west towards the east coast. The heavy black line shows the main water parting, and the basins of four of the largest rivers are separately indicated. The black triangles show where water power has been developed. There are now other stations completed or being built in the Highlands of Scotland.

tides are specially favourable: thus Southampton has double tides owing partly to the tidal wave coming both round the western and eastern ends of the Isle of Wight; Liverpool experiences a powerful scour owing to the bottle-shaped estuary of the Mersey.

Rivers. The rivers of the British Isles are short, and since the mountains are usually on the western sides of the islands, most of the longest ones flow eastwards. The rivers are not as a rule swift enough; *i.e.* they have not sufficient fall to supply hydro-electric power (though some of the Scottish streams have been used, and in Ireland the River Shannon has been harnessed—see Fig. B.67); they are too shallow to be used to any considerable extent by river steamers, but they are very important commercially, because, as already indicated, their mouths are often navigable by the largest ocean-going vessels and afford excellent harbours. They are not normally subject to serious floods but have a gentle flow of water, and they are rarely, if ever, frozen. Look carefully at the map and note the position of these rivers, with the ports which lie near their mouths: Dee, Tay, Forth (east of Scotland), Tyne, Tees, Humber, Thames (east coast of England), Clyde (west of Scotland), Mersey and Severn (west of England). The only large river in Ireland is the Shannon. The fact that the majority of English and Scottish rivers flow eastwards is a fortunate circumstance from the economic point of view, since their mouths face the great river outlets of the Continent. Though not mountainous, practically the whole surface of England is hilly, and the relative unimportance of water transport, despite an extensive canal system, when compared with France or Germany, is due mainly to the large number of locks necessary on the canals. Britain's canals were constructed for the most part before the coming of the railways and have since fallen more and more into disuse.

GEOLOGY AND MINERALS

The physical features of the British Isles reflect the underlying structure in a remarkable way. Indeed, it is almost impossible to describe the physiography of the country

without reference to the geology. It may, therefore, be useful to analyse the physical units already separated, with reference to their geology.

The Highlands of Scotland consist of a very old massif

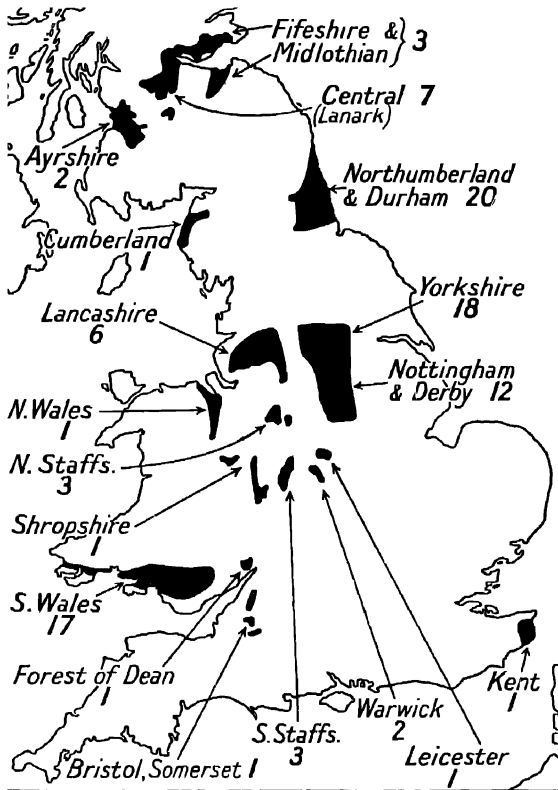


FIG. B.6.—The coalfields of Great Britain.

The figures show roughly the percentage of the total output produced by each field.

mainly of very ancient crystalline rocks, and forming one of the masses already mentioned as lying in the north of Europe. Masses of granite penetrate the old rocks and in some areas are quarried as building stone (as at Peterhead and Aberdeen). The ancient rocks afford but a poor soil;

the Highlands are for the most part covered with moorland and the most fertile land is in the eastern valleys.

The Southern Uplands of Scotland are formed by a folded massif of rocks older than the Coal Measures. Again, they yield but a poor soil, hence the prevalence of sheep pastures.

The Midland Valley is a great rift valley consisting of a block of sedimentary strata let down between the older rocks of the Highlands on the north and the Southern Uplands to the south. The faults which bound the valley run across the country in a north-east to south-west direction. The "Highland Boundary Fault" is especially well marked, and the change of country is remarkable. On either side of the Midland Valley are the Old Red Sandstone rocks; in the centre the beds are mainly of Coal Measure age and include several coal basins—the Central Basin in the west, Midlothian and Fifeshire in the east. Masses of old volcanic rocks give rise to hilly areas in the valley itself (Ochil Hills, Sidlaw Hills, etc.).

The Lake District is one of the ancient massifs of England and was probably once continuous with the Isle of Man. The old rocks in the centre of the Lake District are wrapped round on all sides by younger rocks.

Wales is another ancient massif. The mountains of North and Central Wales are formed by old rocks folded so that the grain of the country is again "Caledonian" (N.E.–S.W.). In South Wales is an area of younger rocks folded into a great basin or syncline, and forming the South Wales Coalfield. The fold has an Armorican or east-west trend.

Devon and Cornwall are also built up of a massif of ancient rocks folded into east-west folds. The rocks have been penetrated by a number of great granite masses and it is with the margins of these granites that the metalliferous zones are associated.

The Pennines form the backbone of the north of England. Originally Carboniferous rocks, probably including Coal Measures with coal seams, were deposited as continuous sheets right across the north of England. Subsequently they were folded by a great fold with a north-south trend and the

rocks on the crest were worn away so that the coal is now found on either side of a central ridge of older Carboniferous rocks. East-west folds also affected the area so that the coal seams actually occur in isolated basins arranged on either side of the Pennine Uplift thus:

Cumberland Coalfield	Pennine Uplift	Northumberland-Durham Coalfield
Lancashire Coalfield		Yorkshire Coalfield
North Staffs Coalfield		Nottinghamshire Coalfield
South Staffs Coalfield		Leicestershire Coalfield

The *Midland Plain* is built up mainly of hardened red mudstones and red sandstones grouped by geologists in the Permian and Triassic systems, though formerly called the

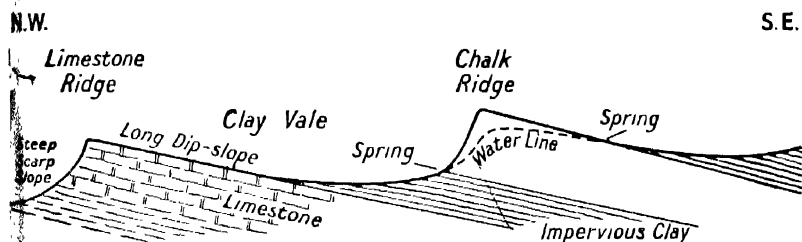


FIG. B 7.—Diagrammatic section illustrating the succession of clay vales and limestone ridges found in the south-east of England.

"New Red Sandstone." The softer of the deposits, which weather to an excellent fertile red soil, wrap round the southern end of the Pennine Chain and partly cover the coalfields on its two flanks. In the plain are "islands" of older rocks which will be described later.

South-Eastern England is underlain by an alternating succession of clays, sands, and limestones which have weathered into a series of "clay vales," and "limestone or sandstone ridges." The latter give the name Scarplands to the area because they have steep "scarp slopes" facing the clay vales and long gentle dip slopes. In the extreme south-east of England is a conspicuous and famous anticline, the Weald, the structure of which is shown in Fig. B.8. To the north of it lies the syncline of the London Basin; to the south the narrower syncline of the Hampshire Basin.

Minerals. Of the mineral output of Great Britain about 90 per cent. by value is coal (including anthracite). Iron ore, though important, is only about 1.5 per cent. All other minerals of which the annual value is over £1,000,000 each are non-metallic, and include limestone and chalk (for cement), and limestone for building stones, igneous rocks (especially granite for building and road stone), gravel for making concrete, sand for building, slate, clay for bricks, salt, china clay, and sandstone. Of the metallic minerals for which Britain was once famous, including tin, copper, zinc, and lead, only lead and tin are now of any considerable importance. During the Second World War two or three small oilfields were developed,

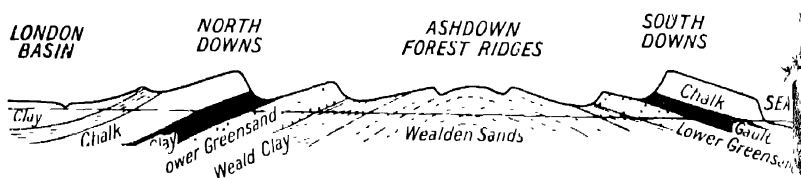


FIG. B.8.—Section across the Weald from north to south.

the chief being near Nottingham. The mining industries in Great Britain give employment to over a million people in normal years.

Coal. Reference has already been made to the disposition of the British coalfields. The following table is appended to show the relative importance of the *chief* fields (figures in millions of tons):—

Field	1909-13	1922-24	1929-35	1950-54
Scotland. . .	41	37	31	25
Northumberland	14	14	13	13
Durham . .	40	37	32	27
South Wales . .	51	52	40	24
Yorkshire . .	39	45	42	40
Notts and Derby	29	30	28	38
Warwick, Leic. and S. Staffs	—	14	14	10
Lancs. and N. Staffs. . .	30	26	21	25

The *total* production of coal in the British Isles averaged 280,000,000 tons in the years 1909-13, compared with

262,000,000 tons in 1923-5, 248,000,000 tons in 1927-30, 215,000,000 tons in 1931-5. In 1945 it was only 174,000,000 tons. Although between 220 and 230,000,000 tons were mined in 1951-7, it is now nearly all used in the country. There are still huge reserves in the coalfields.

The quality of the coal differs from one field to another.

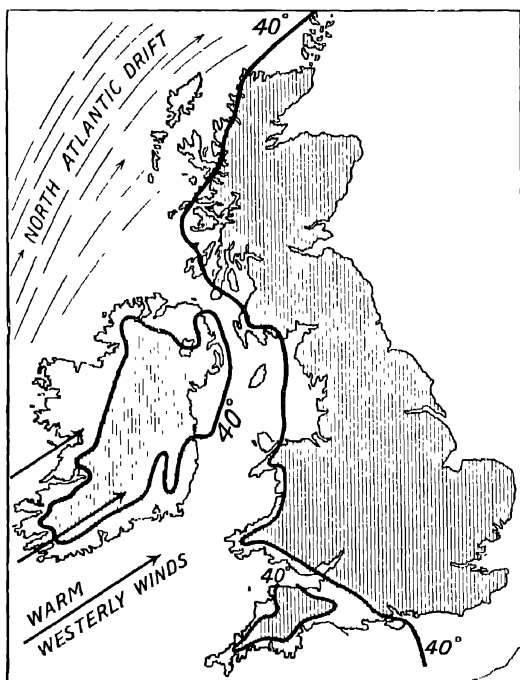


FIG. B.9.—British Isles, January temperatures.

In winter the west coast is kept warm (above 40° F. in January) by winds which blow mainly from the south-west as well as by air warmed because it has been over the North Atlantic Drift. The warmest parts of all are the extreme south-west of Ireland and the Scilly Isles. Compare the temperature line of 32° shown in Fig. E.7.

Anthracite is practically restricted to the western part of the South Wales field; the other coals of South Wales are particularly celebrated as steam coals. It should be noted that nearly all the coal raised in Great Britain is of Carboniferous age; there are practically no brown coals.

Gas and coke are made from coal. Most electricity used is generated from coal and imported oil, some from water power

(especially in the Scottish Highlands) and a little from the atomic power stations now being built in remote areas.

Iron Ores. Although the prosperity of the iron and steel industry of the British Isles was consequent to a large extent upon the association of iron ore and coal in the coalfields, comparatively little of the iron ore now mined is from coalfield regions. The most important iron ores are the bedded sedimentary ores of low grade but large extent and easily mined,

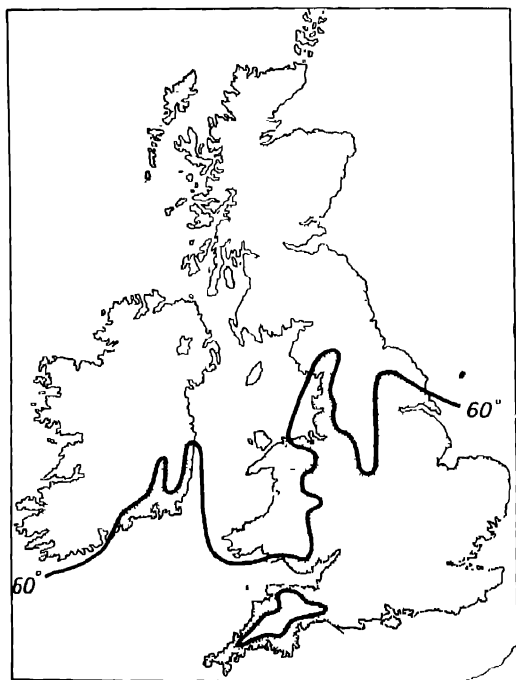


FIG. B.10.—British Isles, July temperatures.

The south is warmer than the north in summer. Compare Fig E.8.

occurring in the Jurassic rocks, especially in the Cleveland field of Yorkshire, and in Lincolnshire and Northamptonshire. The only coalfields where iron ore is still mined in any quantity are North Staffordshire and Scotland. The Cumberland and North Lancashire iron ores, mined especially near Barrow-in-Furness, are purer ores and occur as masses in limestone.

Metals. Amongst metallic minerals the once famous tin fields of Cornwall have now but a small output. There is a small production of wolfram from the same area, but that of copper is now almost negligible. Lead ore is widely

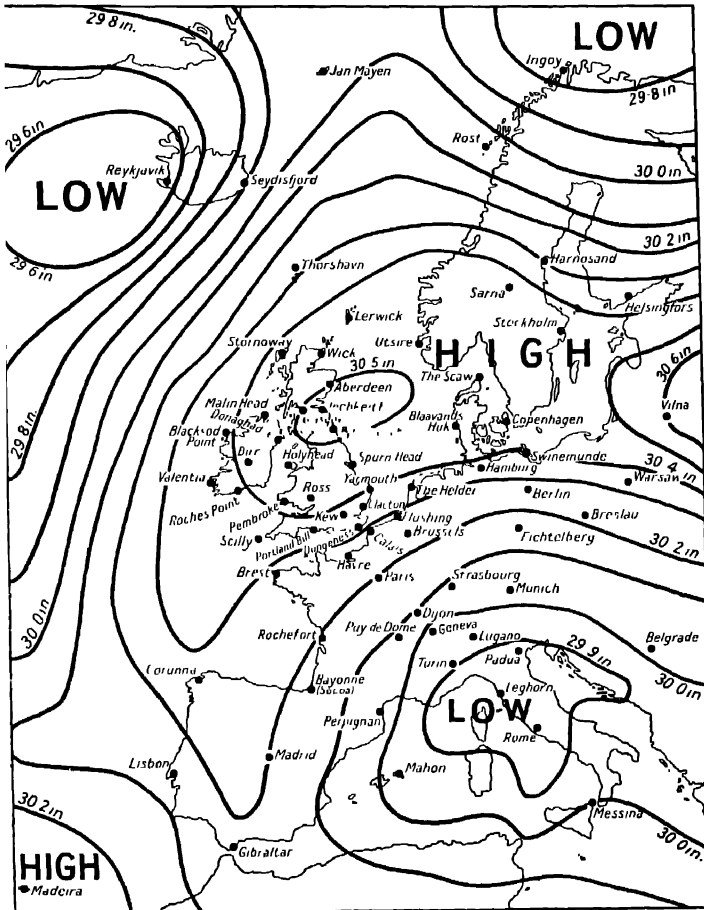


FIG. B.11.—Weather-chart of North-Western Europe for a day in January showing typical winter conditions with a low-pressure system over Iceland, a high-pressure system over the Azores, and a high-pressure system over Eastern Europe.

The influence of the latter is felt as far west as the British Isles, causing a marked cold spell with bright frosty weather.

distributed in the British Isles, but the workings are all small. They are or were mainly in northern England, Derbyshire, and in the Lead Hills of southern Scotland.

Non-metallic Minerals. The British Isles are well supplied

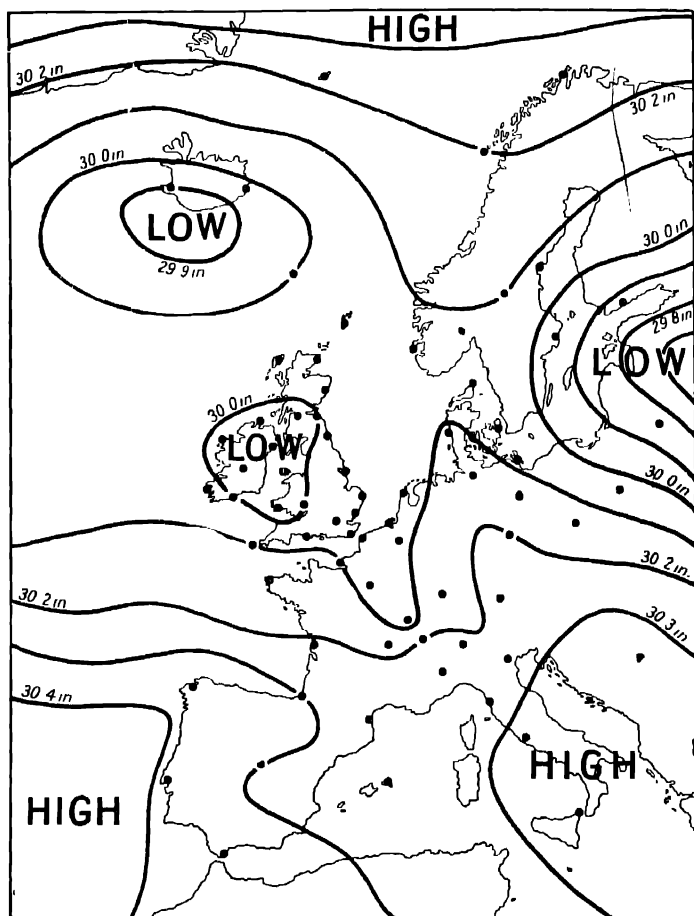


FIG. B.12.—Weather-chart of North-Western Europe for a day in June, showing typical summer conditions.

Again there is a low-pressure system over Iceland and a high-pressure system near the Azores, but small depressions and ridges of high pressure are passing over the British Isles from west to east towards a great low pressure area in Eastern Europe. The result will be varied weather—cloudy with showers and bright intervals.

with building stones and road metal. Amongst the former the grey granite of Aberdeen and the handsome Shap granite of Cumberland may be specially noted; the magnesian limestones of the north-east of England; the Portland oolites and Bath freestones of the Portland and Bath districts respectively.

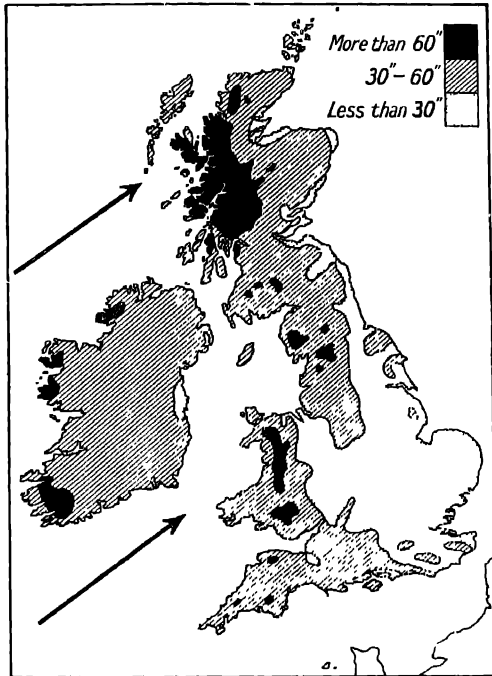


FIG. B.13.—British Isles—map of average annual rainfall.

Notice that the heaviest rainfall is on the hills and in the west. The arrows show the direction of prevailing winds

Enormous quantities of limestone, including chalk, are burnt for the production of lime and Portland cement—the cement works using chalk on the lower reaches of the Thames and Medway are very important. Concrete is made by mixing cement and gravel so that with the enormous increase in the use of concrete for roads, airfields, and buildings generally,

there has been a great demand for gravel. The gravel is obtained mainly from old river terraces and the waste of good farm land which results from the working of gravel is serious. The china clay industry of Devon and Cornwall is also important; the china clay occurs as an alteration product occupying pockets in certain of the granite masses, but especially near St. Austell. Formerly clay for brickmaking was widely dug in many parts of the country, but there has been a marked tendency to the concentration of the industry in a few areas—notably at Peterborough and Bedford. The fireclays and ganisters (hard, fire-resisting sandstones) of the coalfields have,



FIG. B.14.—Section across the Pennine Range, showing the rain-shadow area on the east

of course, special uses, and so have the pure white pottery or “ball” and “pipe” clays such as those of Poole. The slates of North Wales and Devon-Cornwall are less important than formerly, owing to the decrease in popularity of slate as a roofing material. The decrease in importance of the Scottish oil-shales is partly the result of exhaustion, partly of the competition of foreign crude oils. The most famous area for salt is Cheshire, but there are large deposits under the Tees valley. Mention should be made of the fine moulding sands of the Midlands, very important in the iron industry.

CLIMATE

The British Isles have a milder and more equable climate than any other land so far away from the equator. This is due mainly to the warm North Atlantic Drift and the continual influence of the warm moist Westerlies. In winter the east is colder than the west, in summer the north is colder than the south. See Figs. B.9 and B.10, and compare them with E.7 and E.8. The highest land is in the west, so the greatest rainfall is in the west; eastern England lies in the “rain-shadow” of the

Pennines and western mountains. Although the *general current* of air is from the south-west, actually the daily weather in the British Isles is determined by the passage of depressions which tend to cross the North Atlantic from west to east, and pass over the British Isles. Wet, stormy, and changeable weather is usually associated with the depressions themselves ;

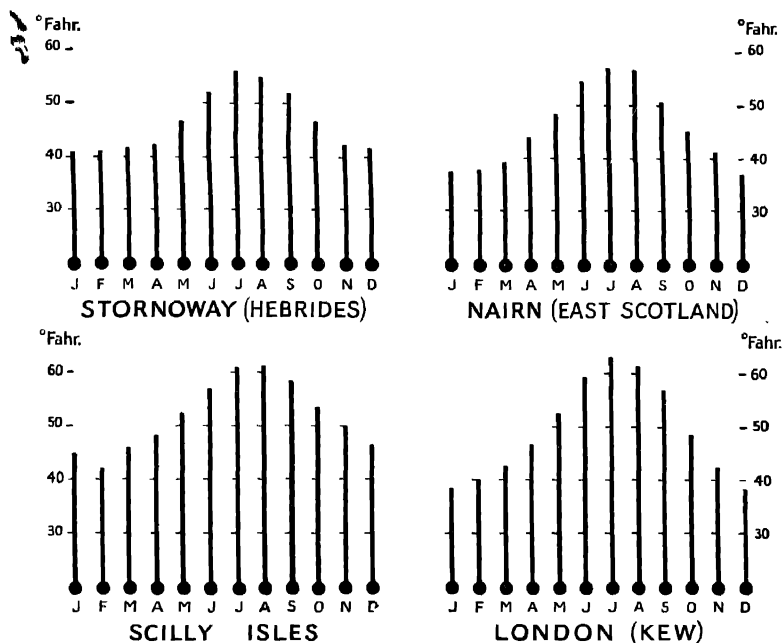


FIG. B.15.—Four temperature graphs from the N.W., N.E., S.W., and S.E. of the British Isles.

The least variations are found in the north-west quadrant, the greatest in the south-east. Compare Figs. B.9 and B.10 for an explanation of this.

fine, settled weather (often very cold and with fogs in winter) with wedges of high pressure or anti-cyclones.

By reference to world conditions (see p. 37), it will be remembered that the British Isles lie between the high-pressure belt which encircles the globe in the neighbourhood of the Tropic of Cancer and the low-pressure belt which encircles the globe in the neighbourhood of the Arctic Circle. The

former belt reaches its greatest intensity about the Azores; the latter about Iceland. Hence the constant reference in British weather reports to the semi-permanent depression over Iceland. In winter, owing to the cold, there is generally a high-pressure area over Eastern Europe; in summer it is usually a low-pressure area. It will be obvious that the British weather

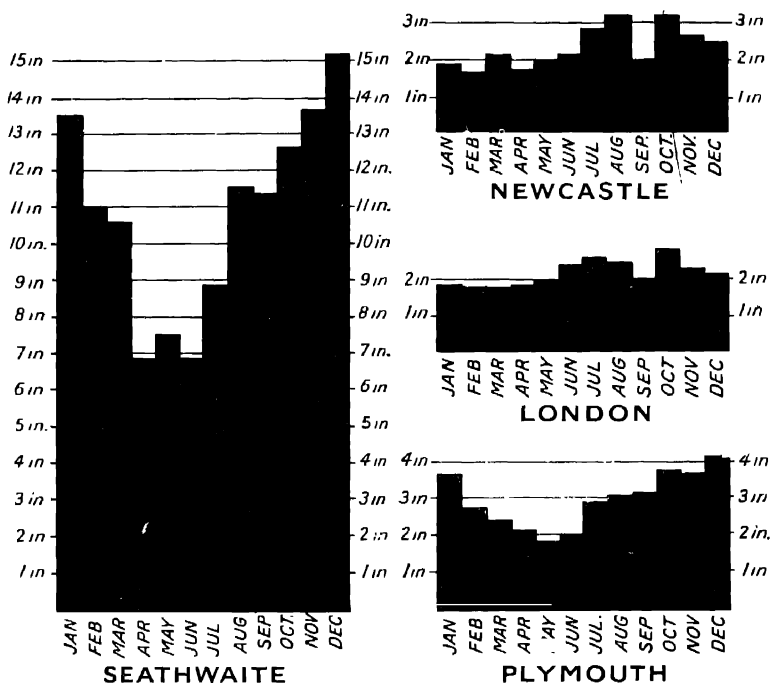
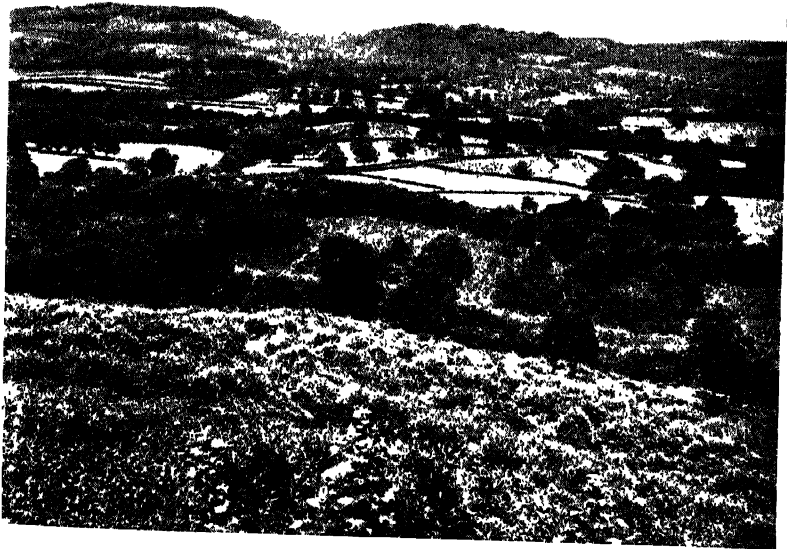


FIG. B.16.—Four rainfall graphs, showing the even distribution throughout the year of British rainfall.

Seathwaite (Lake District) is one of the rainiest stations in the British Isles; Plymouth is in the damp south-west, Newcastle and London on the drier east. In the west rather more rain falls in the winter than in the summer, but in the east July and August tend to be wetter than the winter months because of summer thunderstorms.

is determined very largely by the relative strength or importance of these three semi-permanent pressure systems, which are, actually, closely related to normal world conditions. The rainfall in the British Isles is fairly evenly distributed through the months of the year (see Fig. B.16), there are no extremes of

temperature, so that evaporation is comparatively small. As a result, although the rainfall in parts of Eastern England is as low as 20 inches per year, it is ample for agriculture, and it is rarely that the countryside is sufficiently long without rain for even the grass to become dry and brown. Because rainfall exceeds evaporation, there is no need for irrigation in ordinary farming.



[Photo. Crown Copyright Reserved.]

FIG. B.17.—Typical English country.

Notice the many small fields separated by hedges. In the foreground (centre) is rough moorland or heathland

NATURAL VEGETATION

The natural vegetation of the British Isles has now been so largely removed that it is difficult to picture the country as it

was. Broadly speaking, the whole of the lowlands must have been clothed with thick deciduous forest of oak, ash, beech, birch, and other common trees of the countryside. Extensive tracts of marsh land, such as the Fen country and Romney Marsh, formed breaks in the spread of forest, whilst rising above it were the moorland tracts of the Welsh Highlands, the Pennines, the Southern Uplands, and the Highlands of Scotland, as well as some of the grass-covered downs of the chalk country. On sandy tracts and in the north, in Scotland, coniferous forests replaced the deciduous woodland, and even on low ground the heaths, still so typical of sandy soils, must have existed much as they are at present. It is interesting to notice that the settlements and highways of the early Britons avoided the low grounds, for these were only thick forest or marshes, and are found on the high ground, which is, at the present day, the location of comparatively few villages or towns. At the present day the ancient forests have been so largely removed that forests and woodland occupy a smaller proportion of the surface than in any other European country. But the British Isles still appear to be well wooded, because of the numerous small woods, hedgerows with isolated trees and "park like" scenery so characteristic of the country. The following table shows how the surface in the British Isles was being used in the year 1950.

	Woods and plantations	Rough grazing land	Permanent Pasture	Arable	Other land
	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
England . .	6	8	28	40	18
Wales . . .	6	28	29	21	16
Scotland . .	7	57	6	17	13
Northern Ireland	2	21	32	36	9
Irish Republic	2	12	45	23	18

This table shows the very small area actually covered by woods and plantations in all parts of the British Isles. Nearly all

the timber required has to be imported, yet there are millions of acres of moorland which might be planted with trees. Since 1919 it has been the task of the Forestry Commission to plant some of this land with trees. More forest land is one of the greatest needs of Britain. Most of the "rough grazing land" is the heather-clad and grassy moorland which covers such huge areas of the uplands. The high percentage in Scotland is particularly noticeable, since most of the Highlands are included.

AGRICULTURE

The relative importance of agriculture in Britain is perhaps best gauged by noting the value of primary production compared with that for manufactures. These figures are for *Great Britain*:

	1935-8 £	1946-8 £
Agriculture	275,000,000	608,000,000
Fisheries	16,000,000	40,000,000
Mines ¹	215,000,000	400,000,000 ²
Manufactures	3,404,000,000	6,000,000,000 ²

The type of farming varies very much according to geographical conditions. On the borders of the great moorland areas the farms consist of a few fields of grass, oats, root crops, and a large acreage of rough grazing. Here the farmers are *hill-sheep farmers* and rear sheep. On slightly better land the farmers *rear cattle*, selling the animals to farmers with better and richer lands on the plains. On the lowlands a very large number of the farmers are *dairy farmers* and their chief product is milk which is sent mainly to the towns though some is made into butter and cheese. Other farmers *fatten* bullocks or sheep for the butcher and this is especially important in such midland counties as Leicestershire where the animals fatten on grass, or in parts of Scotland where crops are grown especially for fattening the animals. In the wetter land of the

¹ The value of the mineral output has fluctuated widely in recent years owing to disturbances in the coal industry. The 1926 total was only £143,000,000, owing to the great coal strike. In 1943 the value of coal alone was £250,000,000, but prices have been increasing, and in 1950 it reached over £400,000,000. The number employed in farming is about a million; more than in mining of all types.

² Rough estimates.

western counties we find *mixed farms*, often run just by the farmer and his family, which grow a variety of crops and keep a variety of animals. It is mainly in the drier eastern counties that there are large *arable* farms growing crops for sale. Then there are specialised types of farming such as *fruit growing* and *market gardening* which need particularly favourable soils and local climates

More and more British farmers have concentrated on milk because it is difficult to bring fresh milk from abroad and less on grain, which is more easily imported. But during the war Britain had to feed herself as nearly as possible and British farmers were marvellous in the way they increased their production. One of the greatest needs of the present day is to grow as much as possible on the home land.

In 1939 British farmers were producing between 35 and 40 per cent. of the food eaten in the country; during the war, from 1939 to 1945, the production reached 55 to 60 per cent. and great changes took place. Most of the "rough hill pasture" or moorland of the hilly western counties of England, Wales, and large parts of Scotland, still remains as shown in Fig. B.18. In 1939 only the drier eastern counties of England and Scotland had more ploughland than permanent grass; over the whole of the lowlands of the Midlands and west more than half the land was under grass, and in many counties the proportion was more than three-quarters. During the war so much land was ploughed that this is no longer true. Land ploughed and cropped is more productive, but more workers have to be employed so it is more expensive.

Compared with farming in the new lands of the world British farming is "intensive" and much manure, both animal and chemical fertilisers, is used. Crop rotation is practised, commonly a four-year or Norfolk system in the east, a six-year in Scotland, and a longer rotation in western England.

Clover and other leguminous crops are very important factors in the scheme since, as a result of bacteria living in their root nodules capable of "fixing" atmospheric nitrogen and converting it into nitrogenous plant foods, they *add* to the fertility of the soil instead of detracting from it. A system commonly

used is wheat in the first year, followed by a root crop such as sugar beet or potatoes, then oats or barley, finally clover with sown grasses left for 2, 3, or more years. But the enormous increase in the use of chemical fertilisers has rendered rotation less important. Chemicals are also much used as sprays against

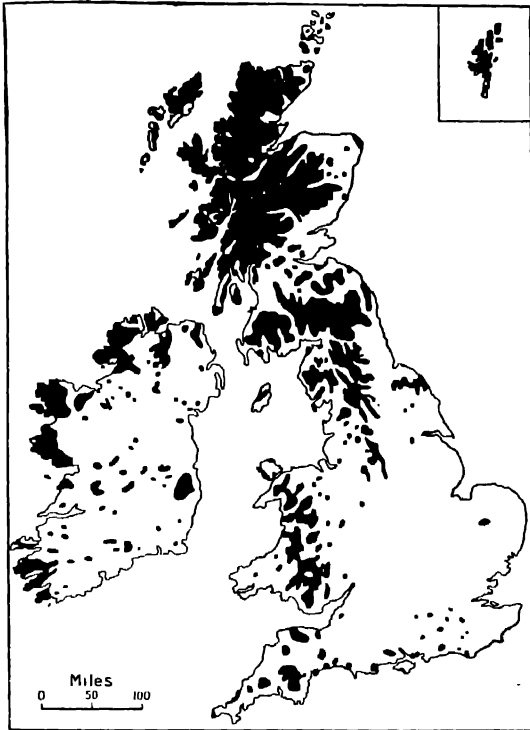


FIG. B.18.—Rough hill pastures in the British Isles.

pests, diseases, and weeds. Since the Second World War British farming has become the most highly mechanized in the world.

Wheat. British farmers have recently been encouraged to grow wheat by the Government. During the war over 2,000,000 acres were sown in England and Wales—nearly double the area a few years ago, but the area in Scotland is still small because there the northern limit for its cultivation is reached.

Ireland, on the whole, is too damp to grow good wheat. The average yield of over 45 bushels of 60 lbs. per acre is more than double the world average so that even before the war Britain grew at home roughly 2,000,000 tons compared with an import of over 5,000,000 tons. In the wartime peak of 1944 3,140,000 tons were harvested.

Barley. Barley flourishes only really well in the drier eastern



[Photo: Farmer and Stock-breeder.]

FIG. B.19.—A typical English farm.

A picture taken in winter with hay being fed to cattle in the stock-yard and a tractor waiting to take farmyard manure out to the fields.

counties—about half is used for making beer, about half for feeding cattle.

Oats. The ability of oats to withstand the cooler, damper climate of the north and the damper climate of Ireland and the western part of Britain is well shown by the large area in Scotland, Ireland, and Wales. But oats grow all over the British Isles.

Root Crops. Turnips, swedes, and mangold (all largely

used for cattle and sheep feed and stored in clamps for winter use) occupy large areas and so do potatoes. Before they were introduced many animals almost starved during the winter.

Hay and Fodder. Hay and fodder crops cover more land than all the grain and root crops together. Juicy kale is now widely grown.

Peas and beans are other important crops; in recent years *sugar beet* has grown greatly in importance in the dry eastern counties of England. The flax of north-eastern Ireland is less

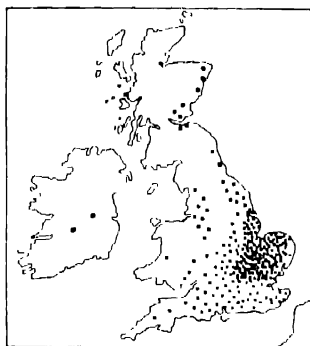


FIG. B.20.—The wheatlands of the British Isles in 1939.

Notice that they are mainly in the dry south-east; the west of England is too wet, Scotland is too cold. In olden days when there was no import, wheat had to be grown all over the country and this was repeated during the Second World War.

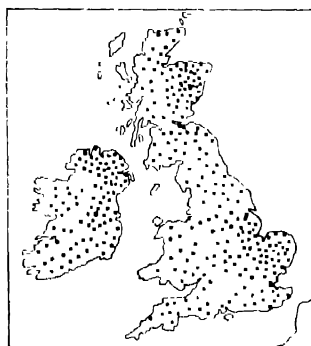


FIG. B.21.—The oat-growing regions of the British Isles in 1939.

Oats, like wheat, grow in the drier east, but they can ripen under colder and damper conditions than wheat, and so are largely grown in Scotland—more extensively than any other grain crop.

important than formerly but during the war was grown again in several parts of England.

Orchards. Fruit orchards occupy 250,000 acres in England and Wales, 1,290 acres in Scotland. Special mention may be made of the cider-apple orchards of Herefordshire, Devon, and Somerset, and of the fruit orchards of the “home counties” supplying the London markets. Kent, along the fertile northern slopes of the North Downs, is, *par excellence*, the county for “small fruit”—raspberries, strawberries, currants, gooseberries, etc.—which cover 70,000 acres in England and

Wales, and 10,000 in Scotland (mainly in the sheltered valleys of the east coast). Hops are of importance in the Weald of Kent and in Hereford.

Live Stock. Horses. With the increase in motor transport and the mechanisation of farming, horses are rapidly decreasing in numbers. There are now fewer than 500,000 on British farms, compared with nearly 2,000,000 in 1920.

Sheep. England has long been famous for wool of excellent quality—so excellent that there was still, until very recently, a small export for special purposes to the United States—and sheep numbered in 1934 about 17,000,000 in England and Wales and 7,500,000 in Scotland. So much land was needed for growing crops during the war that the total number of sheep in Britain fell to 12,000,000 in 1944. There is a somewhat remarkable specialisation, and distinct breeds tend to be strictly localised. The famous Lincoln and Leicester breeds are confined very largely to those counties; the Southdown to the chalk downs of the southern counties; the Romney Marsh to that damp flat stretch in southern Kent. The chalk downs afford some of the finest pasture in the country; the sheep which are bred on the rough hill pastures of Wales and Scotland tend to be inferior in the quality of wool but yield excellent mutton. Sheep now number over 22,000,000.

Cattle. There are over 6,000,000 cattle in England and Wales; 2,000,000 in Scotland, and 2,000,000 in Northern Ireland. It will be noted that in Ireland cattle outnumber sheep, for the damp pastures of that island are pre-eminently suited to cattle rather than sheep. Broadly speaking, half the cattle in the British Isles are classed as "beef cattle," half as "dairy cattle." In Great Britain the dairying industry is directed in the first instance to supplying the huge demand for milk—the production in the last 20 years has been between 1,200,000,000 and 1,500,000,000 gallons—and secondly for butter and cheese. Formerly the seats of the dairying industry were dictated by the existence of suitable rich damp pastures; latterly the prime factor is one of markets and marketing arrangements—hence the now very important dairying industry in the dry eastern county of Essex near the great metropolitan area of consumption.

Pigs. Although there are nearly 5,000,000 pigs in Great Britain and nearly 1,500,000 in Ireland, the bacon industry is not as prosperous as it should be, and pork and ham are of greater importance than bacon.

FISHERIES

The fisheries of the United Kingdom employ about 40,000 men—or in all give employment to double that number. The annual catch may approach a million tons, worth between £40,000,000 and £50,000,000, but a considerable proportion of this is from distant waters. Herrings comprise about a quarter of the catch, cod a third and haddock 15 per cent. No less than 35 per cent. of the whole catch was exported in the years before the war. By far the richest fishing grounds are in the North Sea, so that the leading fishing ports—Grimsby, Aberdeen, Hull, Yarmouth, and Lowestoft—are all on the east coast. The pilchard fisheries were formerly important off the south-western peninsula; there is a considerable amount of fishing in the Irish Sea (port: Fleetwood). Oysters are important at Whitstable and on the Essex coast. In olden days fish used to be landed at many little ports all round the coast. Now, with the use of large vessels and the need for speed in handling the trade has become concentrated in a few large ports.

POPULATION

At the census of 1951 (there was no census in 1941 owing to war) no less than 80 per cent. of the population of England and Wales (total population 43,750,000) were classed as "urban," leaving only 20 per cent. rural. In Scotland the position is roughly the same. In England and Wales no less than 47 boroughs (and in Scotland 4) were found in 1931 to have populations exceeding 100,000—more than in India with a total population then of 353,000,000. In 1951 there were 66 towns in England and Wales exceeding 100,000. In Great Britain only about 8 per cent. of the population are farmers; by far the greater number are concerned with manufacturing industries, commerce, and transport services.

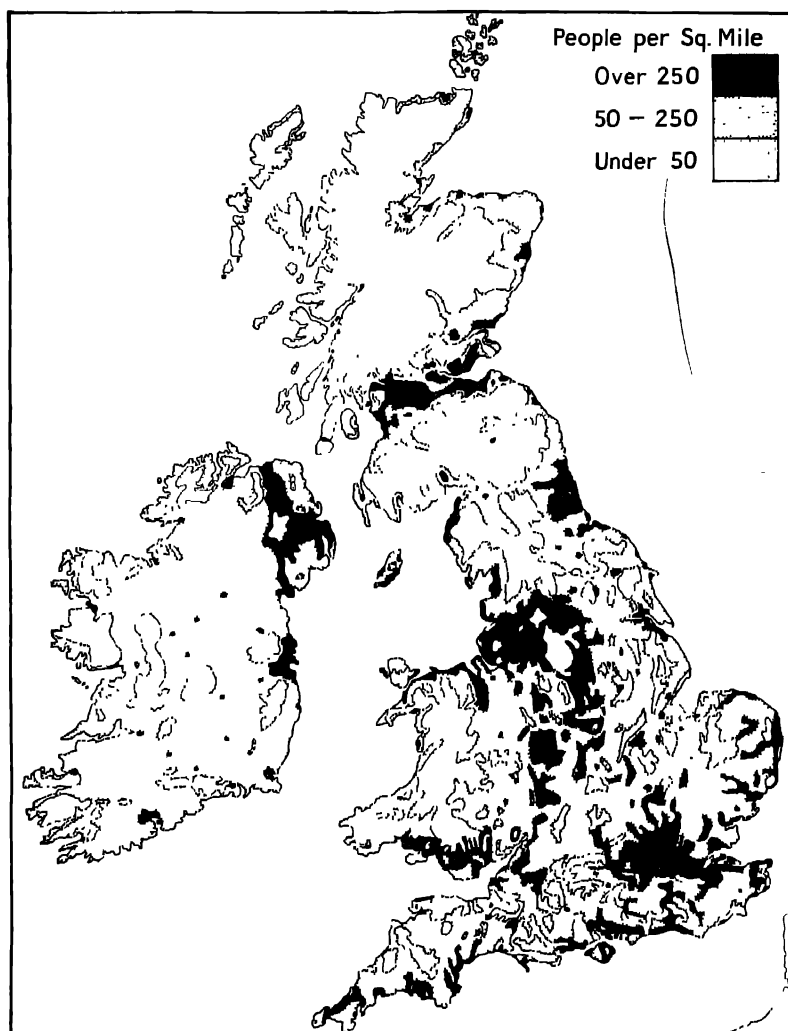


FIG. B.22.—The population of Great Britain.

This map should be compared carefully with the physical map (Fig. B.3) and the map of natural regions (Fig. B.4).

The black areas are mainly *industrial* areas; the heavily dotted areas correspond with richer agricultural lands; the lightly dotted areas are the poor agricultural lands—moorlands, mountains, etc. Some parts of the latter are almost uninhabited.

A hundred and fifty years ago, when agriculture was the leading occupation, the only thickly populated counties of England and Wales were the agricultural lands of the south-east and Midlands. With the coming of the Industrial Revolution the coalfields became the areas of densest population, and to a large extent have remained so unto the present day. With the increasing use of electric power there is now a marked tendency towards "decentralisation"; many leading industrial centres are not situated on coalfields, and in particular there is a marked increase in industrialism in the south of England. A fifth of all the people of Britain live in Greater London.

MANUFACTURES

Two features are characteristic of the distribution of manufacturing industries in the British Isles. Despite the tendency just mentioned, one is still the marked coincidence of the great industrial areas with the coalfields, and the other is the marked specialisation of individual areas. The first point will be made clear by comparing Figs. B.6 and B.23. The second point is illustrated very roughly in Figs. B.23 and B.28.

Textiles. The products of textile industries made up 40 per cent. of the total value of British exports of home origin in 1909-13 and 1924, but less than 10 per cent. recently. This drop indicates the effect of the growth of home textile industries in many parts of the world which formerly bought from Britain, and the changes in fashion such as the use of artificial silk.

The cotton industry is the greatest, yet in England the spinning and weaving of cotton are almost restricted to the west side of the Pennines, mainly to that part of Lancashire which lies south of the Ribble, and in Scotland to Glasgow, Paisley, and other manufacturing towns of the west. The soft water from the Millstone Grit rocks of the Pennines has been an important factor in this localisation. Manchester (with Salford) is the business centre, Oldham and Bolton are great spinning towns, whilst Burnley, Blackburn, Preston, Bury, and

Rochdale are weaving towns. For its supplies of raw cotton Lancashire is still mainly dependent on that imported from the United States and Egypt through Liverpool, but supplies come also direct to Manchester by the ship canal. In the

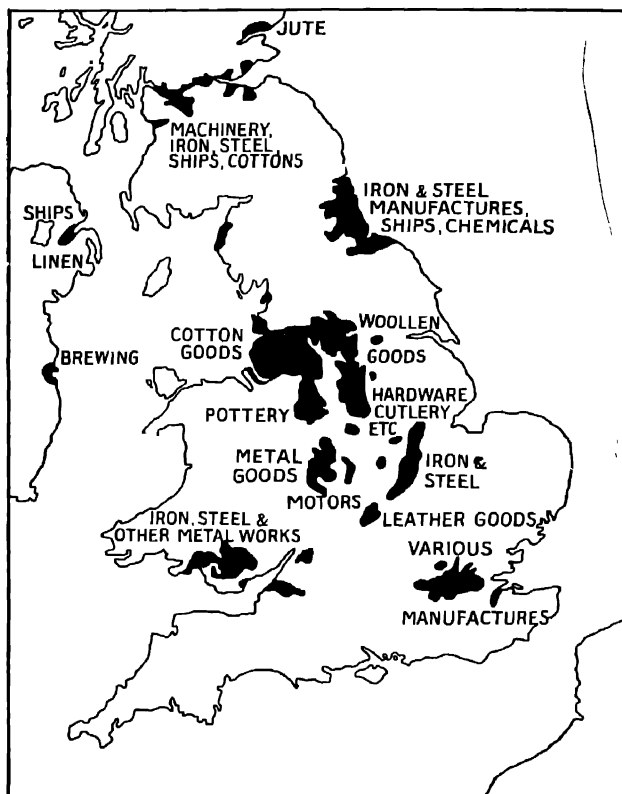


FIG. B.23.—The principal manufacturing areas of Britain. Notice that most of them coincide with coalfields.

years between the two world wars about one-sixth of the cotton yarn produced was exported but over four-fifths of the cotton piece goods. There have since been great changes and many towns have been paying attention to other industries, including artificial silk.

The woollen industry is centred in the West Riding of Yorkshire, especially around Bradford and Leeds. The narrow dales to the west of Leeds are filled with larger or smaller manufacturing towns engaged in the industry, for the most part established in the Middle Ages when suitable water for scouring supplies of fine lustrous wool from the neighbouring moorland pastures, and the low cost of living, were the great advantages offered by these locations. Bradford is the great worsted centre; other towns engaged in various branches of the woollen industry are Halifax, Huddersfield, Dewsbury, Keighley, and Batley. In Scotland several towns in the basin of the Tweed are famous for the fabrics known as "tweeds." Other woollen manufactures are carried on in towns of the coalfield regions. In Ireland woollen manufacturing is largely limited to Belfast.

The silk industry is pursued mainly in Derbyshire and the neighbouring parts of Staffordshire and Cheshire—at Derby, Ilkeston, Chesterfield, Macclesfield, Congleton, and Leek. The output of silk goods is now less than that of artificial silk (rayon) and nylon, and in view of the fact that many cotton and woollen firms have taken up this new industry it is becoming widely distributed.

Jute fabrics are manufactured mainly at Dundee (see page 244). The manufacture of *clothing* is quite distinct from the making of the cloth itself whether woollen or cotton. London and Leeds are great centres for this industry. Similarly the *knitwear industry* is distinct and associated with Leicester and Nottingham.

Iron and Steel. Iron and steel and their products made up nearly 20 per cent. of British exports of home origin before the Second World War. The "heavy industries" suffered periods of depression in the inter-war years but by 1954 output of pig-iron and steel both reached record levels (steel to nearly 20,000,000 tons) and provided the raw materials for nearly half Britain's exports. The chief seats of iron-smelting are on the Tees estuary around Middlesbrough; in South Wales at Ebbw Vale, Cardiff, and Port Talbot; in North Lancashire and Cumberland (Barrow, etc.), and on the Midland iron-ore fields

at such new towns as Corby and Scunthorpe. In connection with the manufacture of articles made from iron, two towns in England are especially noteworthy—Birmingham and Sheffield (each with the surrounding district). Shipbuilding is associated with the iron and steel industry especially in the Clyde area, the chief seat of shipbuilding in all its branches in the world, along the Tyne, Wear, Tees, and at Belfast. Railway rolling stock is manufactured at works the location of which was largely determined by the requirements of the railway companies when they were separate units—at Crewe, Derby, Swindon, etc. The motor-car industry is especially important at Coventry, Birmingham, and Oxford. The aircraft industry is scattered but with notable centres at Bristol and Coventry. Birmingham specialises in brass work and other metals; Swansea in the South Wales coalfield on tin-plate.

Other Industries. The making of earthenware and porcelain is associated with the "Pottery towns" of Stoke and its neighbours on the North Staffordshire coalfield. Alkalis, chemicals, and glassware are important in Cheshire (associated with salt deposits) and South Lancashire (St. Helens, Warrington, Widnes, etc.), and Tees mouth. The leather industries are centred at Northampton, Leicester, Stafford, and other Midland towns. Paper is manufactured especially where conditions are suitable for the receipt of the bulky raw material and where there are adequate supplies of pure water. North Kent on the Thames estuary has become a leading area.

COMMUNICATIONS

Inland Waterways. Inland waterways played an important part in the early days of the Industrial Revolution in many parts of England. But the surface of England is not as favourable to the construction of canals as that of France or Germany, and the low hills between the river basins which must be crossed necessitate a large number of locks. This is one of the main reasons why, with the coming of the railways, the canals became of comparatively little importance. At the present time they only carry one twenty-fifth of the traffic handled by the railways. The Manchester Ship Canal is not

included in this figure because it is scarcely an "inland waterway" but is rather an artificial arm of the sea which makes Manchester a seaport. Apart from this ship canal, the most prosperous canal system is the Aire and Calder which links Leeds with the Humber estuary.

Railways. Great Britain has 20,000 miles of railways,

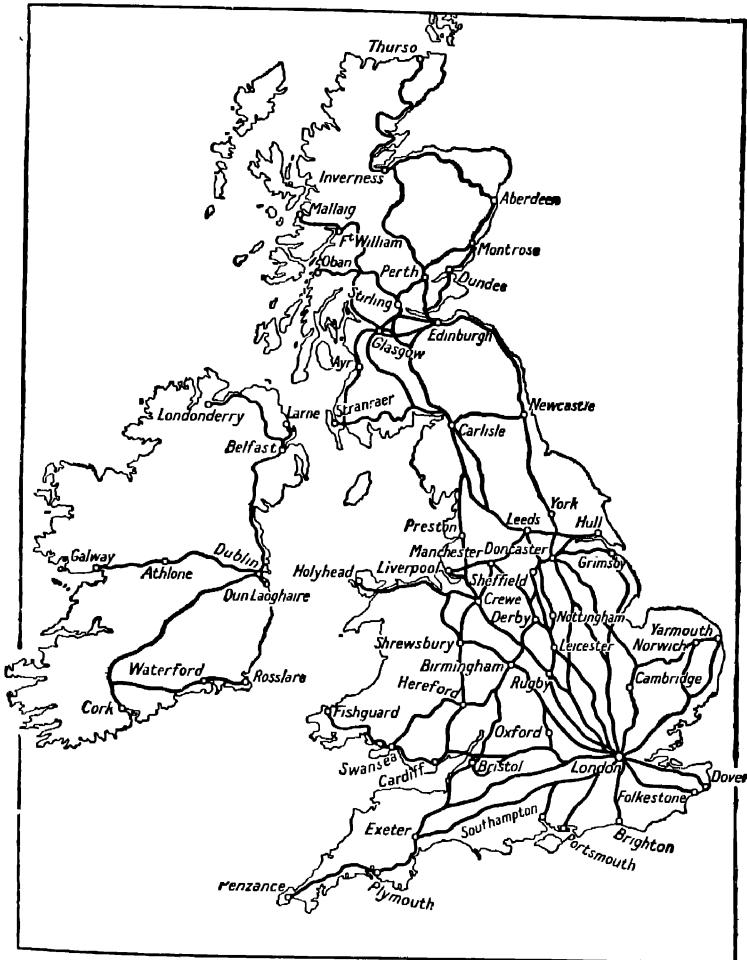


FIG. B.24.—Railways of the British Isles.

grouped from 1923 to 1947 into four systems—the London Midland and Scottish (7,464 miles in 1923), London and North Eastern (6,464 miles), Great Western (3,765 miles), and Southern (2,129 miles). On January 1st, 1948, all the railways

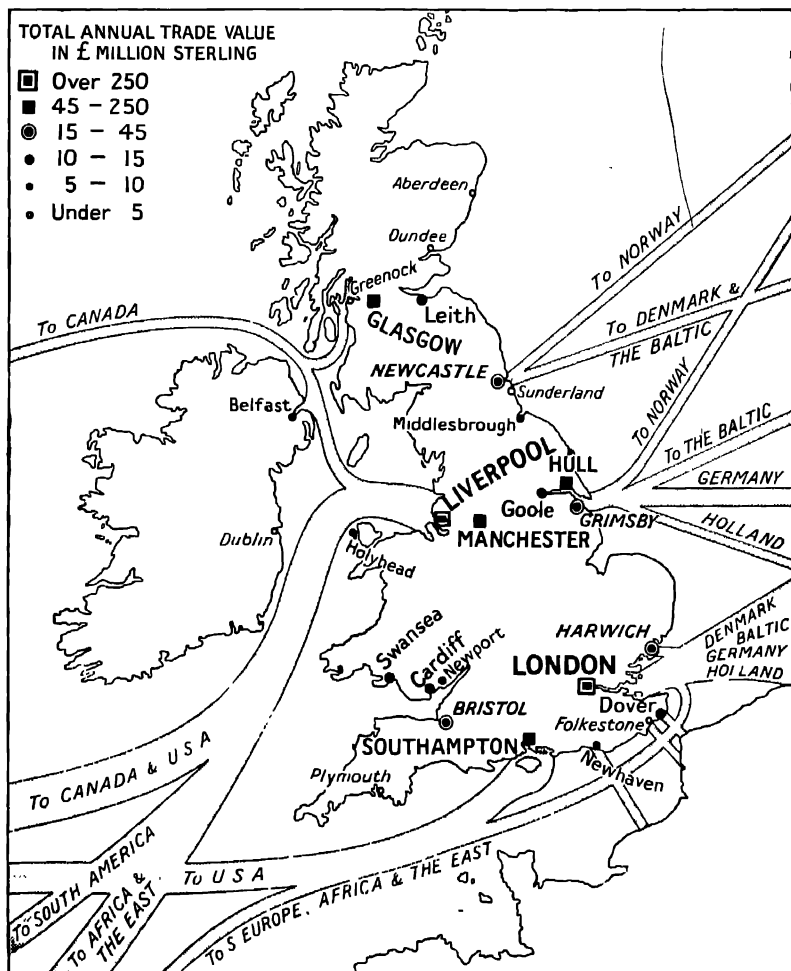


FIG. B.25.—The ports of Great Britain.

The chief ports are shown by the route-lines from them.

were nationalised as British Railways, organised in six regions. The railways should be studied in relation to their direction from the great focus, London, and to the great ports which they serve. The increased efficiency of motor transport and the very excellent road system of the British Isles has led to greatly extended use of the roads both for passenger and goods traffic.

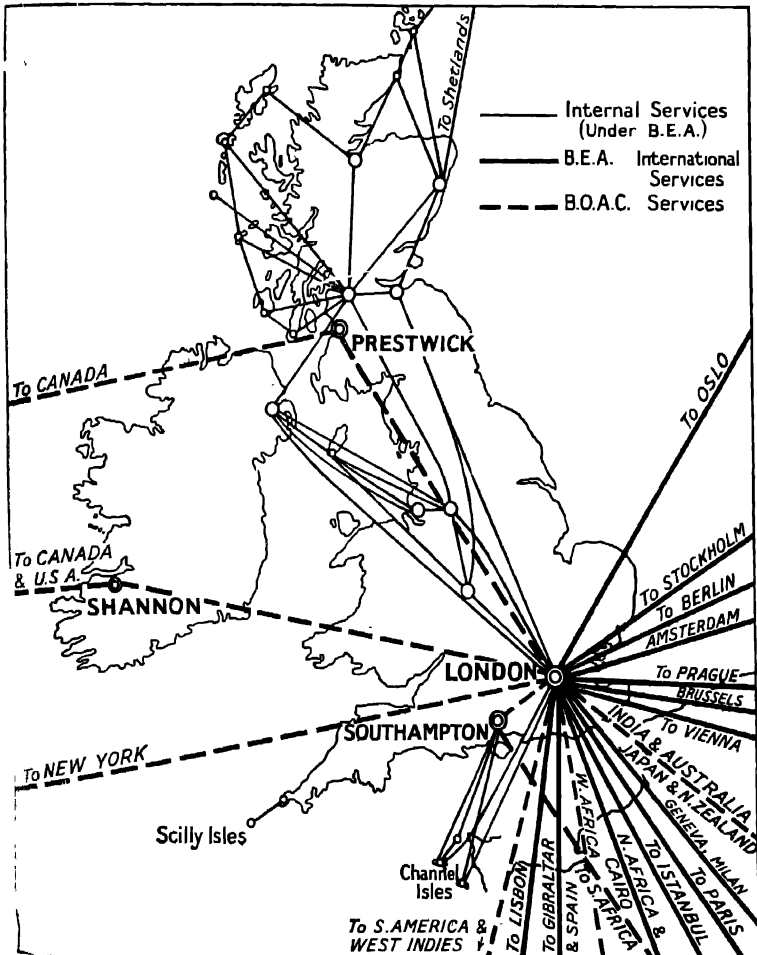


FIG. B.26.—British Air routes.

B.E.A.=British European Airways; B.O.A.C.=British Overseas Airways Corporation.

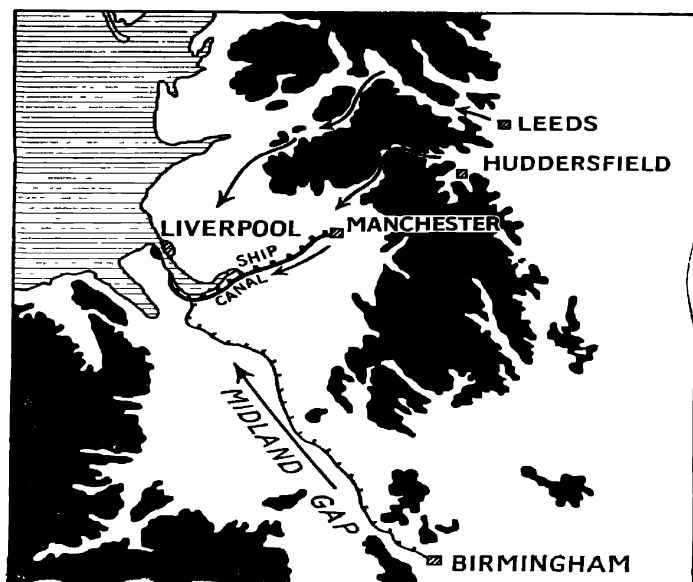


FIG. B.27.—Map showing the position of Liverpool.

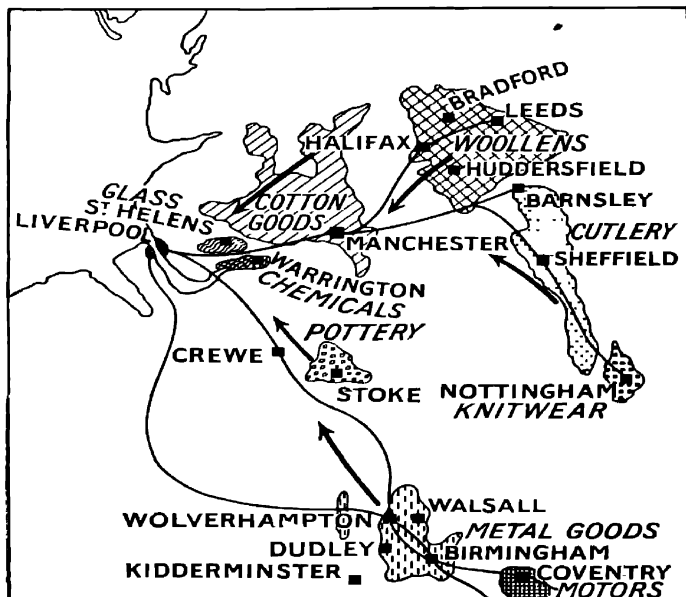


FIG. B.28.—The products of the hinterland of Liverpool.

Ports. Fig. B.25 has been drawn to show the principal ports of the British Isles. The two of overwhelming importance in value of trade are London and Liverpool, the next in order being Hull, Manchester, Glasgow, and Southampton.

London in normal times receives between 33 and 40 per cent. of the imports and handles over 25 per cent. of the exports, and no less than half the entrepôt trade which is so characteristic of Great Britain. Its situation at the head of ocean navigation of a river which allows access a considerable distance into the interior, nearly opposite the greatest of Continental rivers, the Rhine, no doubt helped its early growth and indirectly helped to make it the capital of the country, a position which favoured its further increase. The whole port from the tidal limit at Teddington to the mouth between the Isle of Sheppey and Essex is under the control of the Port of London Authority.

Liverpool has risen to high rank only within the last 200 years. Figs. B.27 and B.28 illustrate the industrial regions situated in its hinterland, and which are connected with the port by rail. The Manchester Ship Canal has also played a large part in the recent development of this hinterland.

Hull is one of the older ports of England and deals especially with Britain's trade with the Baltic. Most of the ports have a foreign trade which is localised and determined by the regular steamship lines that serve them, whilst the steamship lines themselves result from the needs of the ports' hinterlands and the character of the exports. Some attempt has been made to indicate this in Fig. B.25.

FOREIGN TRADE

During the nineteenth century Britain became the greatest trading nation in the world. Before the outbreak of the First World War in 1914 she was sending manufactured goods to every country in the world. In addition there is one raw material which Britain has in abundance and which she was exporting—that raw material is coal. In return for coal and manufactures she was receiving vast quantities of foodstuffs

and raw materials such as cotton, flax, silk, wool, oil, and metals. The value of the *imports*, however, greatly exceeded that of the *exports*. How did Britain then pay

FOOD DRINK & TOBACCO	COAL	STREET	MACHINERY	VEHICLES INCLUDING SHIPS	IRON & STEEL	CHEMICALS	COTTON GOODS	ELECTRICAL GOODS	WOOLLENS	SILK, ETC.	OTHERS
RAW MATS											
M A N U F A C T U R E S											

FIG. B.29.—The exports of the United Kingdom, 1951-2.

GRAIN & FLOUR	MLAT	COCOA TEA	DAIRY PRODUCE	FRUIT & VEG	SUGAR	TOBACCO	OTHERS	METALS & ORES	TIMBER & PULP	CRUDE PETROLEUM	COTTON	WOOD	RUBBER	OTHERS	OTHERS
FOOD, DRINK & TOBACCO															
R A W M A T E R I A L S M A N U F A C T U R E S															

FIG. B.30.—The imports of the United Kingdom, 1951-2.

E X P O R T S 1952 - 54				
STERLING AREA	CANADA	U. S. A.	NON-STERLING O.E.E.C. COUNTRIES	REST OF WORLD
		OTHER AMERICAN DOLLAR COUNTRIES		
STERLING AREA	CANADA	U. S. A.	NON-STERLING O.E.E.C. COUNTRIES	REST OF WORLD
		OTHER AMERICAN DOLLAR COUNTRIES		
I M P O R T S 1952 - 54				

FIG. B.31.—The direction of foreign trade in the years between the wars.
All diagrams are calculated on values.

In addition to imports and exports Britain had a very large entrepôt trade. Goods were brought especially to the port of London to be changed to other vessels, perhaps after storage, and re-exported

for the extra imports? There were many “invisible” exports to make up the difference. There were receipts from overseas investments (about half the total), receipts from shipping—because British ships carried goods for other countries—and receipts for services rendered as when British

experts worked for other countries, insured their goods and so on. It is no use foreign countries sending banknotes or cheques. They have to send either gold or goods. Thus it was that there was an automatic flow into Britain of foodstuffs and raw materials for the factories as well as many manufactures.

During the First World War Britain was unable to send either coal or manufactures to old customers so that many developed their own coal resources, many took to using oil or waterpower instead of coal and many built their own factories. In the years between the wars Britain had to fight hard for trade and many people were unemployed because foreign countries were not needing British manufactures any more. Then came the Second World War. Britain sold nearly all her foreign investments to pay for war needs, Britain lost a very large proportion of her ships, and was unable to export more than a few manufactures. Now Britain has to export enough to pay for all she imports—indeed, Britons must work and export or starve. In addition Britain needs to develop her own land to the full and produce as much from home farms and mines as possible.

THE NATURAL REGIONS OF THE BRITISH ISLES

THE HIGHLANDS OF SCOTLAND

Scotland north of a line drawn obliquely across the country from the mouth of the Clyde to Stonehaven is occupied almost entirely by a great mass of highlands. The valleys and coastlands of the east are the most fertile and populous parts of this area and differ widely from the main mass of the Highlands.

The Highlands may be described as a great plateau of ancient rocks. Although the rocks include gneisses, schists, slates, quartzites, and other metamorphic rocks of varied nature, together with innumerable intrusive masses of granite, intrusive veins and dykes and, in some parts of the west, extensive flows of lava, it is noteworthy that the scenery does not change greatly with variations in rock-character. Over

the whole there is the same general dissected plateau character. The hills tend to be rounded in their outlines and to reach a common level. Large areas lie between 2,000 and 3,000 feet,

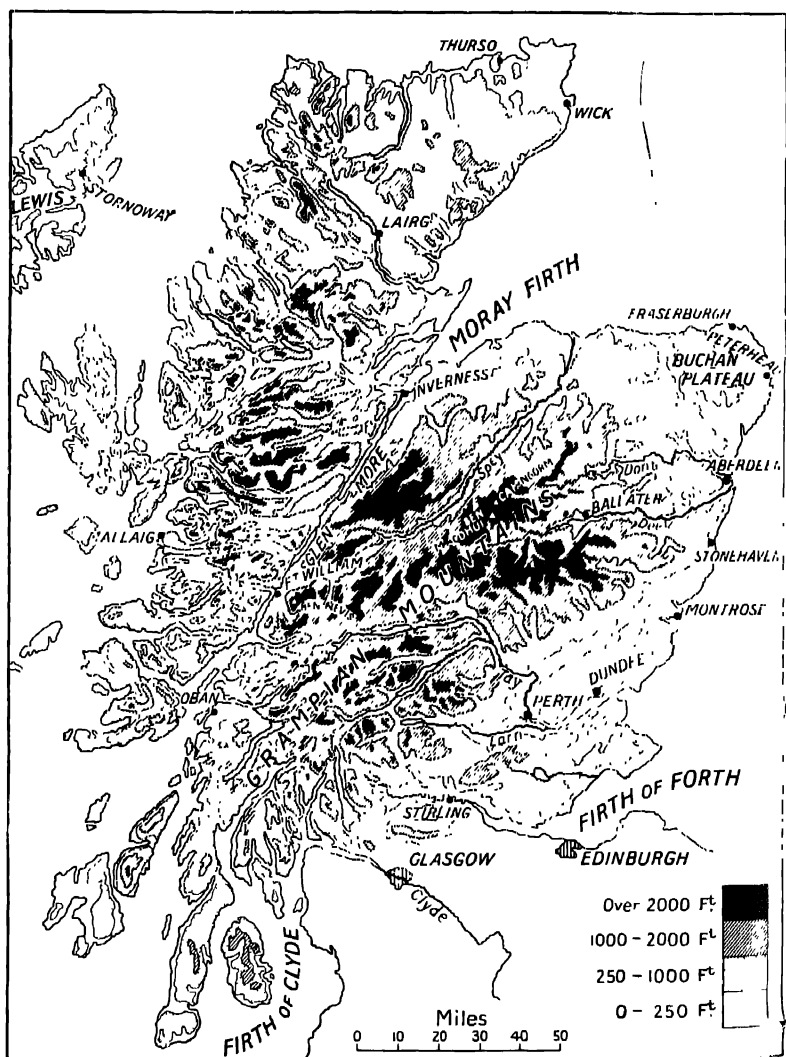


FIG. B.32.—The Highlands of Scotland.

a large number of points lie above 3,000 feet, but only half a dozen reach over 4,000 feet. The latter include Ben Nevis (4,406), the highest point in the British Isles, Cairngorm, and Ben Macdhui. Some geologists believe that the smoothing of the Highlands is the result of marine denudation, and point out that platforms, apparently wave-cut, can be detected at lower levels, especially at 1,000 feet, on part of the west coast. Whatever its origin, the original plateau has been very deeply dissected. In the heart of the Highlands great hollows are occupied by gloomy, forbidding lakes, and on the west coast deep fiords, occupied by arms of the sea, run far into the land. The "grain" of the country is predominantly from north-east to south-west—the well-known Caledonian trend. This is the direction of the great Glen More which cuts right across Scotland and divides the Highlands into two groups—the North-West Highlands and the South-East or Central Highlands or Grampians. Authorities differ concerning the origin of the valleys and "lochs"; they appear to be valleys along faults or lines of weakness in the crust which were occupied by small streams before the Ice Age and were deepened by glaciers during that period. The sea-lochs of the west are, at least, typical fiords, with steep sides going directly into deep water, sharp, almost right-angled bends, and often with a bar only covered by a few feet of water near the mouth or entrance. The ice-caps also were responsible for many of the rounded outlines of the Highlands and for sweeping away any pre-glacial soil.

Climatically, three parallel strips may be



FIG. B.33.—Section across Scotland.

distinguished. The western strip has a heavy rainfall, almost everywhere over 60 inches a year; the summer is humid and short. The central strip is rather drier, the winter colder (below 40° in January), but the summers still damp and cool. The eastern coastal strip is definitely drier (see Fig. B.13), and though the winters are cold and the summers cool, the larger amount of sunshine benefits agriculture.

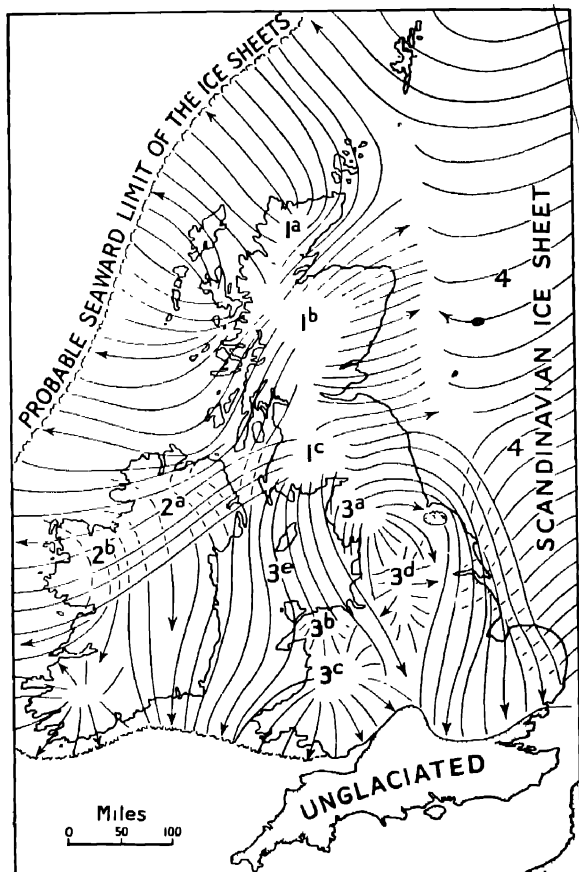


FIG. B.34.—The glaciation of the British Isles.

The numbers mark the various local ice-caps or ice-sheets, the arrows the direction of flow of the ice. Where a district was first affected by one ice-sheet and later by another, the last one is shown by the plain lines, the earlier one by broken lines.

Small mineral deposits occur in various parts of the Highlands, but there are no workings of importance. Farming and fishing are therefore the two main occupations. Nearly all the uplands are covered with moorland—mainly grass moors in the wetter west, heather moorland in the centre. Many of the valleys or depressions are occupied by bogs, where the acid nature of the soil makes cultivation impossible and where the low elevation prevents drainage. It follows that agriculture is restricted to small, scattered areas in the better drained parts of the glens or near the sea, where fishing can also be carried on. Leaving on one side for the moment the more favoured east coast, the human settlements in the Highlands are small, compact, and widely separated; the system of agriculture is that known as the Crofting System. Each patch of ground, the holding of a family, supplies that family with all its essential requirements—food, fire, and wearing apparel. The average farm is only about five acres—excluding, of course, the hill pastures over which the few sheep and cattle can roam. It is little wonder that there is rarely a greater population density than 50 to the square mile, and that the crofters add fishing to their activities whenever possible. The famous “homespun” tweeds are produced by the villagers from yarn spun from local wool. The only other surplus exportable is young stock—young cows or bullocks. Many of the little towns, such as Lairg, consist essentially of an inn and market place for the accommodation of man and beast in this trade. There are few inland towns or even large villages in the Highlands; on the west coast are Oban and Mallaig, both railheads. The once flourishing little town of Stornoway in the island of Lewis has suffered from the introduction of steam trawlers, which make it more economical to land fish on the mainland rather than at a small port on an island. Although the lakes occupying the deep trench of Glen More have been connected by the Caledonian Canal, which can be used by small steamers, this line of communication between the east and west coasts has never been of great importance. The nodal towns of Fort William and Inverness at either end are of greater significance in

connection with north-south routes. Mention must be made of the use of the Highlands as "deer forests" and grouse moors, the annual influx of sportsmen in the past has brought considerable wealth to the region. Now increasing attention is being paid to afforestation and the development of water power. All towns and most farms now have electricity.

North-east Scotland, or the east coast from Stonehaven northwards, differs considerably from the Highlands proper. In the Dee and Don valleys, the Buchan plateau, and around Moray Firth there are considerable areas sufficiently level for cultivation; the soils are thin and light, but often rich in plant food. Oats, turnips, and grass are the main crops, but the farmers are mostly concerned with rearing beef cattle. The second great industry is fishing, and, formerly, every little harbour along the coast had a fishing fleet; but the industry is now concentrated in the larger centres, especially Aberdeen, Peterhead, Fraserburgh, and Wick. The great centre of the whole region is Aberdeen, the "capital of the north," with a considerable foreign trade. The working of granite is important in the neighbourhood.

The Orkney Islands are low islands built up largely of Old Red Sandstone like that which surrounds the Moray Firth. As a result, half the islands are under crops and grass and 50 per cent. of the people are engaged in agriculture.

The Shetland Islands, on the other hand, are more rugged, and consist largely of metamorphic rocks like those of the Highlands. Agriculture is less important, though the rough hill pastures are famous for their "Shetland ponies" and the special Shetland sheep. Fishing, on the other hand, is more important than in the Orkneys. Lerwick, the chief town, is the port and principal fishing centre.

THE CENTRAL LOWLANDS OR MIDLAND VALLEY OF SCOTLAND

Central Scotland has always been the most important part of the country, and at the present day supports three-quarters of the total population. The region is well defined on the

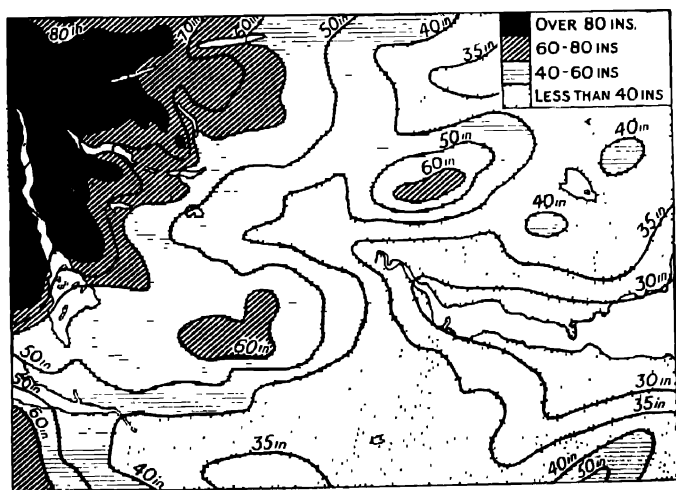
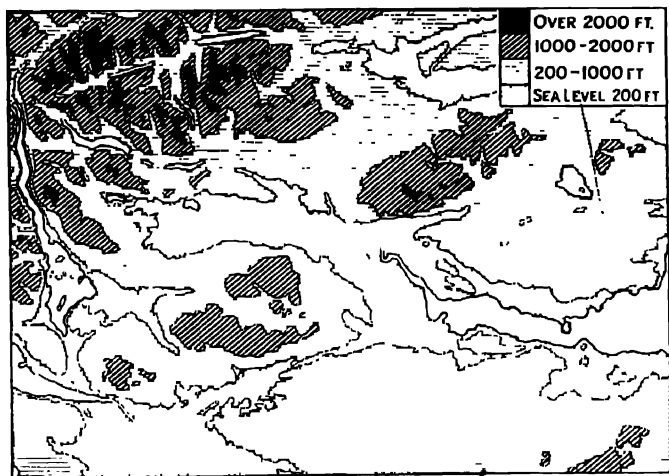
north by the abrupt edge of the Highlands along the Highland Boundary Fault, and rather less clearly on the south.

Geologically, the Midland Valley is a broad syncline of sedimentary rocks let down between the older rocks of the Highlands on the north and the Southern Uplands on the south. The youngest rocks are near the centre of the syncline, the older ones along its margins. Consequently there is a broad belt of Old Red Sandstone along the northern margin and a narrower, less continuous belt along the south. Carboniferous rocks occupy the centre, but owing to folding and subsequent denudation the coal-bearing beds are restricted to the three basins shown in Fig. B.37—the Lothian-Fife Basin, the Ayrshire Basin, and the Central Basin. The greatest production is from the Central Basin, but the largest reserves are in the eastern basin, though there much of the coal lies under the Firth of Forth. The famous oil-shales of Scotland from which large quantities of oil, wax for candles, and the important by-product sulphate of ammonia have been obtained in the past, but which are now almost exhausted, lie near Edinburgh. Other economic minerals include fireclay and iron ore. In both the Old Red Sandstone and Carboniferous rocks there are large areas of volcanic rocks which have been more resistant to weathering than the surrounding sediments and so stand up as hill masses. Consequently Central Scotland is far from being a plain. There is a central lowland belt in which lie the coalfields; then a belt of hills built of volcanic rocks on the north—the Renfrew, Kilmarnock, Campsie, Ochil, and Sidlaw Hills—separated from the Highlands by a series of valleys of which Strathmore is especially famous. On the south of the central depression there is also a line of hills, less clearly marked than the northern belt and not very sharply separated from the Southern Uplands.

Very broadly, the western part of the Central Lowlands is drained by the Clyde, which rises in the Southern Uplands, the eastern part by the Forth and its tributaries, which rise in the Highlands. By no means the whole Central Lowland, however, lies in the basins of these two rivers. The north-east, including Strathmore, is drained by the lower Tay and its

tributaries, the south-west by the Ayr and other rivers flowing direct to the sea.

Climatically the chief points to notice are that the west is



FIGS. B.35-36.—A rainfall map of the Midland Valley, with a physical map of the same area, to demonstrate the connection between the area of high rainfall and the hills and to show at the same time the gradual decrease in rainfall from west to east. (After H. R. Mill.)

considerably damper than the east, and that the east in sheltered regions, such as the Carse of Gowrie behind Dundee, benefits from the generous amount of summer sunshine. The climatic differences are reflected in the agriculture—cattle farming in the west (with dairy-farming, especially in Ayrshire), arable

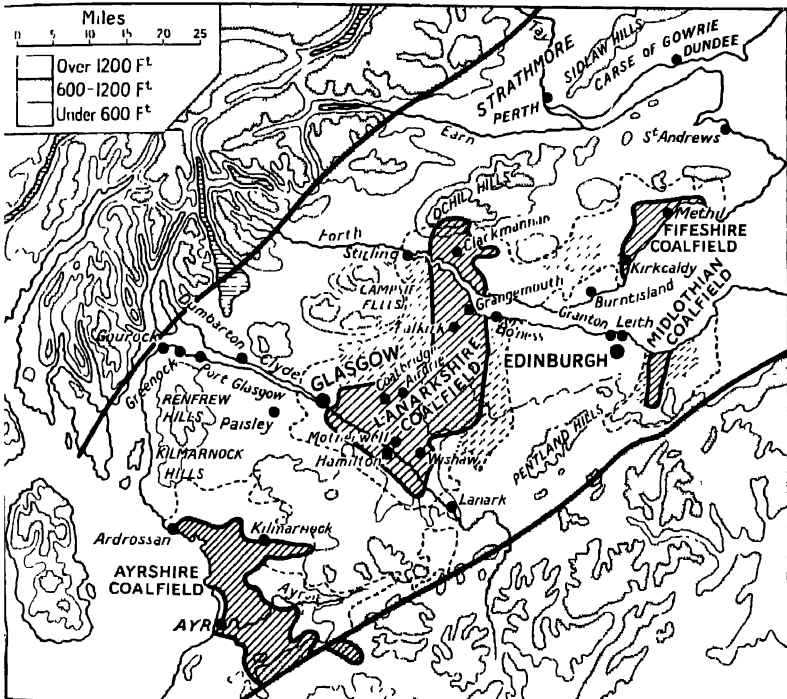


FIG. B 37.—The Midland Valley of Scotland.

Extreme limits of coalfields shown by dotted lines; main parts lined. Within the heavy black lines are the upper coal-bearing series (Coal Measures proper).

farming in the east, with sheep on the hills of north and south. The production of fruit, such as raspberries, in the east, especially the Carse of Gowrie, has given rise to the jam-making industry of Dundee and affords an interesting example of the effect of climatic conditions.

The industrial areas are associated with the coalfields. In the Ayrshire field the main centres are Ardrossan and

Kilmarnock, industrial towns sharing in the industries of the Clyde Basin and specialising in textiles and engineering works.

Associated with the Lanarkshire field is the great industrial region of the Clyde estuary. The Clyde is navigable by large ocean steamers to Glasgow and is linked by canal with Grangemouth on the Forth. The iron-smelting of Motherwell, Wishaw, Coatbridge, and Falkirk no longer depends primarily on local supplies of ore, but on imported supplies, especially from Sweden. Ship-building yards line the Clyde on both banks below Glasgow to Greenock on the south and Dumbarton on the north. The damp climate in the Clyde Basin, as in Lancashire, favours cotton spinning, which is carried on notably at Glasgow and Paisley. The latter town specialises in cotton thread. In addition a great variety of domestic articles is manufactured at Glasgow. Stirling is the focus of that portion of the Central Basin which lies north of the Forth.

The eastern coal basin is divided into two fields by the Firth of Forth—the Midlothian Coalfield on the south, the Fifeshire Coalfield on the north. On the Midlothian field, Edinburgh, with its ports, Leith and Granton, is the chief centre, and numbers paper-making, printing, and brewing amongst its industries. On the Fifeshire field, Kirkcaldy, with its linoleum factories, is the chief centre.

In the east of the Central Lowlands, outside the coalfields, on the Firth of Tay, lies Dundee. Mention has already been made of the supplies of fruit from the fertile Carse of Gowrie in the shelter of the Sidlaw Hills, which have led to the jam industry; the demand for sailcloth, ropes, and fishing nets along the coast led to the flax and hemp industries. The jute industry developed later. The marine engineering industry is the direct result of the former hundreds of fishing boats. In Fifeshire is the old university town of St. Andrews.

THE SOUTHERN UPLANDS

The Southern Uplands stretch right across southern Scotland from the North Channel to the North Sea. The old rocks

have been folded into a great crumpled anticline, of which the northern "limb" has been cut off by the faults which bound central Scotland.

The old rocks afford but a poor soil and the higher regions are clothed mainly with hill pastures, and the population consists chiefly of scattered sheep-farmers. As in all parts of Britain the west is wetter than the east, and bordering the south-west coast in the region long known as "Galloway" are valleys and lowlands where dairy farming is important. Indeed, Wigtown is one of the leading dairying counties of Britain, and sends milk to such centres as Newcastle, Liverpool, and Birmingham. It is noticeable that the dairy farms have developed especially along modern lines of communication. The "short sea" routes to Ireland from Stranraer and Port Patrick have helped in the development of railways. Farther east is the well-known country of the "Dales"—the valleys of the Nith, Annan, and other streams which empty into the Solway and afford lines of communication across the Uplands. The main western rail route to Scotland from England follows along Annandale; the line to Ayr along Nithsdale.

The eastern half of the Southern Uplands lies in the basin of the Tweed. The drier climate renders this the sheep-farming region of Scotland *par excellence*, and accounts for the textile industries of the small towns of the Tweed basin. The cottage industry of the sixteenth to eighteenth centuries developed later into the factory industry of Hawick, Galashiels, Peebles,



FIG. B.38.—Section across the Southern Uplands.

Selkirk, Jedburgh, and other towns. The specialisation in woollens of high quality, including especially "tweeds" and hosiery, led to a world-wide demand and necessitated the importation of foreign supplies of raw wool, on which the industry now largely depends. At the mouth of the Tweed stands the border town of Berwick which, though the natural outlet of the basin, is actually in England.

THE PENNINES

The backbone of England has four "vertebrae". In other words, the Pennine Upland can be divided very clearly into four parts or "massifs."

(a) The northern block links the Pennines proper with the hill masses of the Cheviots and Southern Uplands and stretches as far south as the well-known Haltwhistle or Tyne Gap.

(b) The North Pennine massif is a roughly rectangular block stretching from the Tyne Gap in the north to the Stainmore Gap in the south. On the west, it is bounded by a very abrupt, almost cliff-like, scarp 1,500 to 2,000 feet high which overlooks the Eden Lowland and is caused by the Pennine faults. On the east the boundary is not so clear, and may be taken to lie where the Millstone Grits dip under the Coal Measures of the Durham Coalfield—or more simply the western edge of the coalfield. The North Pennine massif is thus a great plateau block, largely more than 2,000 feet above sea-level, tilted to the east and drained by rivers which empty into the North Sea. It is built up for the most part of sandstones, with underlying limestone, belonging to the Carboniferous series.

(c) The next block or massif is roughly the same size as the last and stretches from the Stainmore Gap to the Aire Gap. It is bounded on the west by a scarp caused by the Dent Faults and on the south by the Craven Faults. In the northern part (called also Northern Pennines) limestone (Carboniferous Limestone) predominates, and there are large areas of barren "karst" country. In this limestone country much of the surface is covered with short grass very suitable for sheep-rearing.

The south-eastern half consists of Millstone Grit. There are no coalfields on the flanks of this area; the Lake District lies to the west, north Yorkshire to the east.

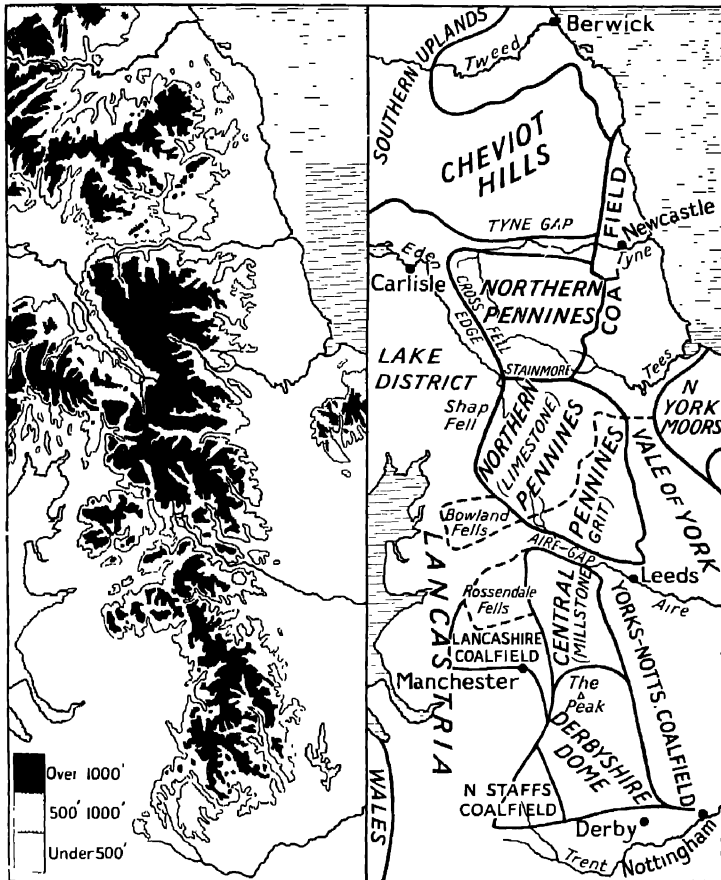


FIG. B.39.—The Pennines.

(d) The southern block stretches from the Aire Gap to the Trent Valley near Derby and Nottingham where the backbone of England may be said to end. The northern part of this area as far as the High Peak is Millstone Grit country—

flat-topped hills covered with peat bogs and with heather-covered moorlands having poor, sour soil on the slopes. The hills are of little use to man in themselves, but afford a valuable gathering ground for pure soft water, which supplies the textile towns to east and south. South of the High Peak there is a central core of limestone, giving the country of beautiful wooded vales and grass-covered hills in the heart of Derbyshire. On either side is a strip of Millstone Grit moorland, and then the North Staffordshire coalfield on the west, the Yorkshire and Nottinghamshire coalfield on the east. The southern portion of the Pennines is much lower than the north, and large areas are below 1,000 feet.

As a whole, the Pennines have a good rainfall—in general more than 50 inches, but the elevation and character of the soil are against agriculture. The population is almost entirely limited to the dales, and even there one finds very little arable land, only grass. Grassland, moorland, and hill pastures cover more than 95 per cent. of the whole area. On these rough pastures sheep and cattle are reared, the former ten times as numerous as the latter, but both reared mainly for meat. There are large areas of the lower slopes which might be forested, and a number of plantations have now been established. There are few towns really in the Pennines except such small “gap towns” as Settle and Skipton, and the inland watering places such as Matlock in Derbyshire.

CUMBRIA OR THE LAKE DISTRICT

The northernmost of the three areas of old rocks which form the upland areas of western England and Wales is that usually known as the Lake District. Together with the central knot of mountains may be considered the surrounding lowlands, the whole region being termed Cumbria and corresponding roughly with the counties of Cumberland and Westmorland, but including part of north Lancashire.

The whole region is clearly defined. On the east the scarp which bounds the Northern Pennines and overlooks the valley of the Eden is one of the most clearly marked physical features in England. To the south-east, however, the Lake District

massif is linked with the Pennines by the Shap Fell group of hills. On the south Morecambe Bay penetrates so far inland as almost to reach the Pennines, and so clearly delimits Cumbria on the south; the Solway Firth performs a similar function on the north. To the west the limit is the Irish Sea.

Into this region so defined there are only four well-marked land routes. From the north the route naturally lies between the head of Solway Firth and the Pennines, and the great route town is Carlisle. To this day the lowest road bridge over the Eden is at Carlisle, and the main west coast railway to Scotland follows this old route. Then there is another route converging on Carlisle—the route from the east which crosses the Pennines by the Haltwhistle or Tyne Gap. A third route, also from the east of the Pennines, is that which follows the Stainmore Gap into the south-eastern corner of the Eden valley. The fourth route is the approach from the south. Kendal occupies a position on this route corresponding approximately to that of Carlisle on the north. The Lake District effectively cuts off Lancashire from Scotland—a fact which is emphasised by the long climb which the railway is compelled to make over Shap Fell.

Cumbria consists of a central rugged mass of mountains—the Lake District proper—and a surrounding ring of lowlands. The central area consists of ancient rocks—hardened sediments and metamorphic rocks with thick flows of ancient lava, all highly folded and penetrated by intrusive masses of granite. This mass of ancient rocks is wrapped round by Carboniferous limestone, and to the north-west is bordered by a tract of Coal Measures—the Cumberland coalfield. The Lake District is remarkable for its well-marked radial drainage—deep valleys, many of them occupied by the famous lakes (Derwentwater, Windermere, Ullswater, Haweswater, etc.), radiating like the spokes of a wheel from a hub, which is in the neighbourhood of Helvellyn (3,118 feet). Scafell Pike (3,210 feet), the highest point in the Lake District, is slightly to the west, Skiddaw (3,053 feet) to the north. In 1950 this mountainous area was designated one of Britain's first National Parks.

To the north-east of the central mass is the lowland of the Eden Valley; to the north the extensive Carlisle Plain; to the south-west a narrow coastal strip; to the south the lowlands which border Morecambe Bay. All these lowland areas (except the last) are partly occupied by red rocks which weather to a fertile soil.

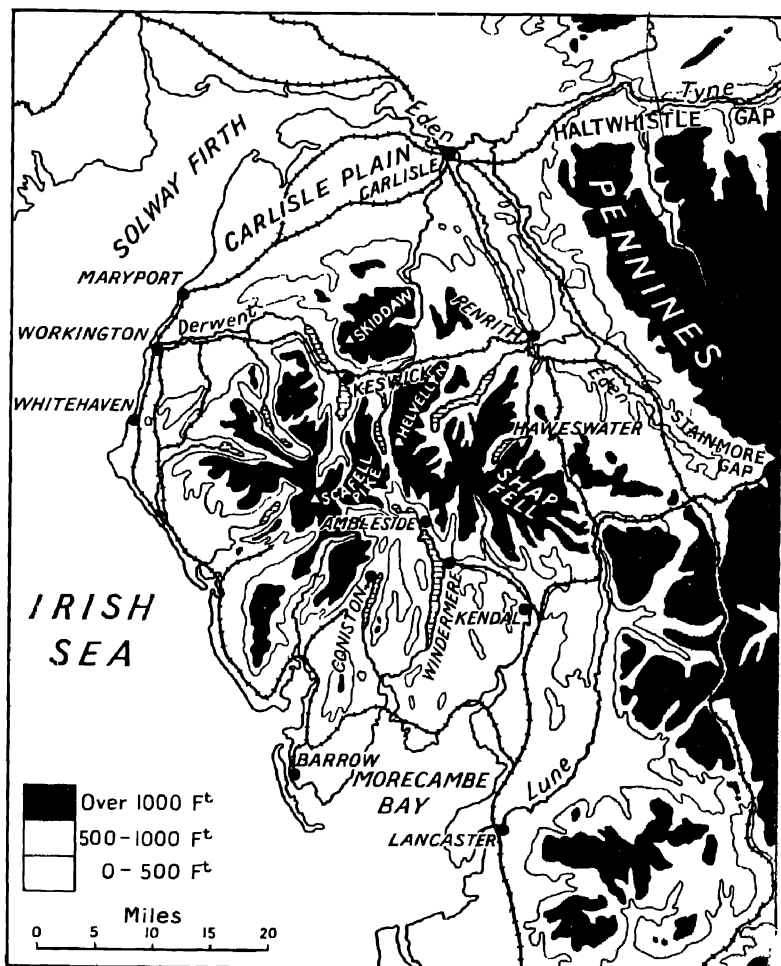


FIG. B.40.—The Lake District.

Although lead and other minerals occur in the old rocks of the centre, metalliferous mining is not now important. Of greater economic significance now are the quarries for the beautiful Shap Granite and for road metal in various places. In pockets in the limestone of the south-west occurs the excellent iron ore—now largely exhausted—which gave rise to the iron and shipbuilding industry of Barrow and Millom—now dependent mainly upon imported ores; to the north-west the coalfield has its centres at Whitehaven, Workington, and Maryport. Britain's first atomic power station is at Calder Hall, south of Whitehaven.

Climatically the mountain area has a very heavy rainfall—Styhead, in Borrowdale, has 150 inches, one of the highest recorded in England—but the Eden lowland lies in its rain shadow and has only 30 to 40 inches, and the lowlands to the north receive but little more.

Apart from the important tourist industry, which practically maintains such centres as Keswick and Ambleside, sheep farming is the principal occupation in the centre. In the heart of the Lake District there is very little land which can be cultivated, and less than two per cent. of the land is so used. Dairying becomes important in the broader valleys which open out on the lowlands. The area of the mountains is insufficient for the streams to be large enough for the development of hydro-electric power, but important reservoirs, Lake Thirlmere and Haweswater, form the water supply of Manchester.

The lowlands, in contrast to the central mountains, have a rich red soil very suitable for cultivation and on which large quantities of oats, swedes, and potatoes are grown. Even more important is dairy-farming, the milk being sent to Liverpool, Newcastle, and other urban centres.

LANCASHIRE AND CHESHIRE

Between the Pennines and the Irish Sea, south of the Lake District, lies a broad lowland which occupies the greater part of the counties of Lancashire and Cheshire. The sea sends its fingers into the area and cuts it up into several parts. The
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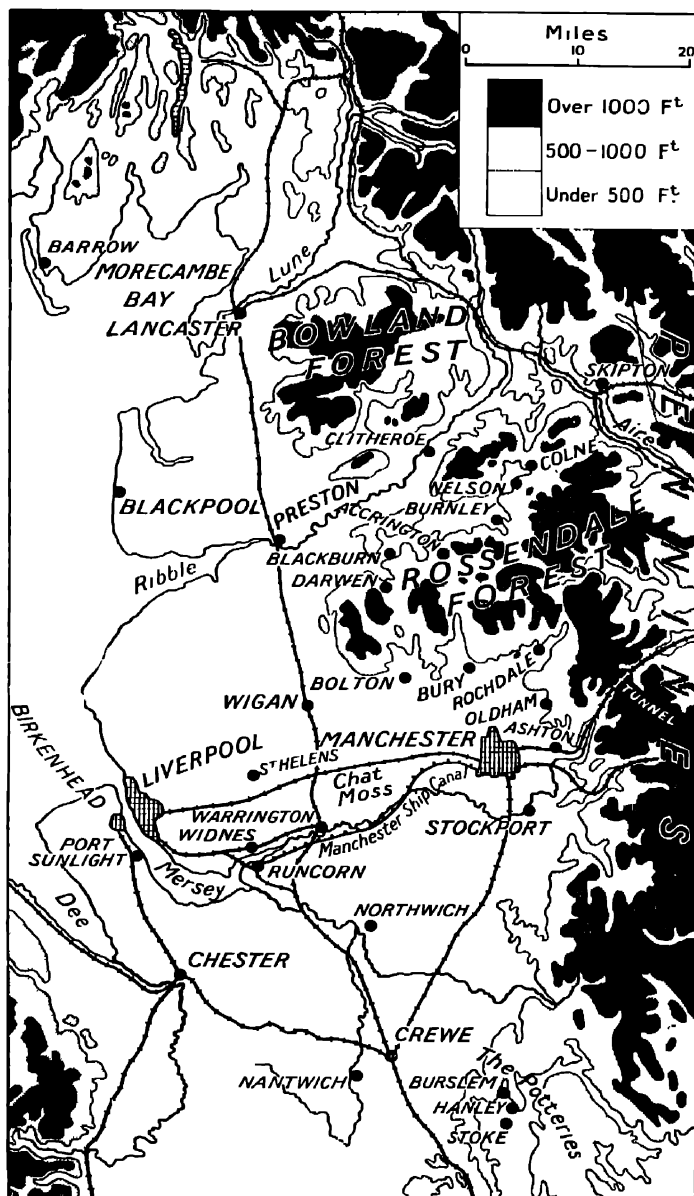


FIG. B 41.—Lancastria.

northern finger is Morecambe Bay, which separates Lancastria, as this region is often called, from the Lake District region. The second finger is the estuary of the Lune dominated by Lancaster; the third the estuary of the Ribble with Preston; the fourth the estuary of the Mersey dominated by Liverpool; the fifth the estuary of the Dee leading to Chester. Although most of the area is lowland, there are two tracts of rough moorland—offshoots from the Pennines. These are Bowland Forest, between the Lune and Ribble; Rossendale Forest, between the Ribble and Mersey.

Except for the two upland areas just mentioned, Lancastria is occupied mainly by stretches of Triassic sandstone and marl like those of the Eden Valley and the Midlands, much of which weathers to a fine rich red soil though partly hidden by glacial deposits. Although we always think of Lancastria as a great industrial region, outside the urban centres west Lancashire and Cheshire are rich agricultural lands. The great crops are potatoes and oats, but grasses are usually sown one year in three or two years in four, and very large areas are under permanent grass. The moist climate favours cattle, and Cheshire is perhaps the most important dairying country in all England. In addition to these fertile tracts large areas of Lancashire are occupied by poor sandy tracts—where the soils are glacial sands or sands derived from the Millstone Grit and other rocks.

But the great importance of Lancastria is as an industrial region, associated primarily with cotton spinning and weaving. Mention has been made above of the five rivers which penetrate the plains of Lancastria; the industrial centres may be considered in relation to them.

(a) Lancaster and the Lune Valley.

The once important Roman military station of Lancaster is now of small importance compared with the great towns of south Lancashire. It remains an important route town through which pass the main west coast routes to the north, but the Lune is too shallow to admit large vessels, and Lancaster has only small manufactures of linoleum and cloth.

(b) Preston and the Ribble Basin.

Not only is Preston itself a much more important centre than Lancaster, but in the Ribble Basin lie all the larger weaving centres of Lancashire. The northernmost town is

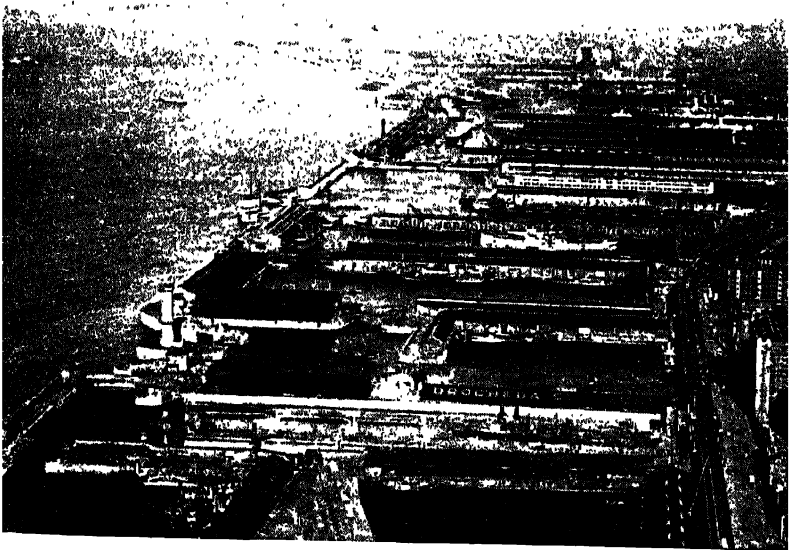


FIG. B.42.—The Lancashire Potteries and North Wales Coalfields.

The round dots show the position of the chief collieries in relation to Manchester (marked by a black square). Scale: 20 miles to one inch.

Clitheroe, actually on the Ribble; to the south are the larger centres of Burnley and Blackburn, both of which have specialised in the past in the cheaper cotton cloths for export. Other centres are Accrington and Darwen. The Ribble

valley affords communication with the Yorkshire woollen region *via* the Aire Gap, hence it is not surprising to find woollens as well as cottons manufactured at Nelson and Colne. The growing importance of artificial silk in many towns should be noted. Preston is the great market, administrative and route centre, but only of minor importance as a port. The position of Blackpool, Lancashire's seaside recreation ground,



[Photo Central Aerophoto Co., Ltd.]

FIG. B.43.—Aerial view of Liverpool Docks.

should be noted. The country around Blackpool, known as the Fylde, is very fertile and devoted to market gardening and poultry farming.

(c) Liverpool and the Lower Mersey.

A description has already been given of the position and importance of Liverpool—with which is included Birkenhead on the opposite side of the estuary. Docks occupy its waterfront; its industries are in the background, but a list of them

shows the close connection with Liverpool as an importing centre—since they include flour milling (of imported grain), sugar refining, oil extraction, soap and margarine manufacturing, as well as the manufacture of foods of varied character, ship repairing, shipbuilding, and engineering. Although the bottle-shaped estuary of the Mersey has a tidal current which has been of great value, in its early days Liverpool was hampered by sandbanks at the mouth, a difficult channel, and an absence of communications with the interior. The story of Stephenson's railway across the boggy land known as Chat Moss illustrates sufficiently the difficulty of linking



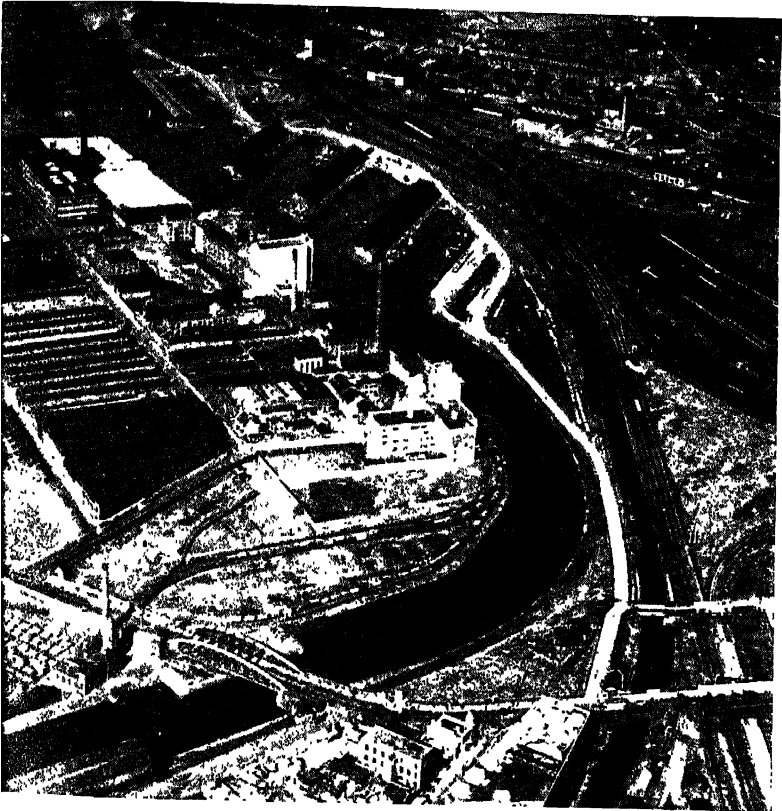
FIG. B.44.—The Manchester Ship Canal.

Liverpool even with Manchester in the early days of its growth, and it is due to the ingenuity of man that the difficulties have been gradually overcome.

(d) Runcorn, Widnes, Warrington, and the Middle Mersey.

The industrial region of the Middle Mersey owes its origin primarily to the Cheshire saltfield, which stretches as far north as the Mersey. Sandbach, Middlewich, Winsford, Northwich and near Runcorn are the chief centres, but the salt is now obtained by pumping water into the "mines" and pumping it out as brine. The abundance of salt led to the establishment of a great chemical industry, whilst the Manchester Ship Canal had much to do with the rise of Runcorn and Widnes as its chief centres. There are many new industrial

Areas, such as Ellesmere Port, along the banks of the canal. This area supplies the chemicals needed for the glass manufacture at St. Helens to the north and for the soap factories of Port Sunlight (near Liverpool), Warrington, and Widnes.



(Photo: Aerofilms, Ltd)

FIG B.45.—Aerial view of Manchester Docks, reached by the Manchester Ship Canal.

Notice the large steamers being unloaded and the numerous factories

(e) Manchester, the Upper Mersey, and south-east Lancashire.

The great manufacturing region of south-east Lancashire

centres on Manchester, and though there are few cotton mills in Manchester itself, which is the business centre and now an important port, over 80 per cent. of the cotton spinning is carried out within 18 miles of the heart of the city. The great spinning towns of Bolton, Bury, Rochdale, Oldham, Ashton, and Stockport lie grouped round Manchester; the northern ones on the Lancashire coalfield. The specialisation characteristic of the industry is seen even among these towns: Bolton concentrates on finer cottons, Oldham on medium. The coalfield town of Wigan, an important centre for the manufacture of cotton-mill machinery, lies to the north-west and beyond the confines of the Mersey Basin. Salford is really part of Manchester whilst near the landward end of the Ship Canal the district known as Trafford Park has many and varied factories.

(f) Chester and the Dee Basin.

The old Roman town of Chester no longer functions as a port, but smelting works for iron and lead, as well as artificial silk factories, exist along the Dee estuary, and the region may one day develop as a large industrial area.

NORTHUMBRIA

Having considered the two natural regions of Cumbria and Lancastria, which lie to the west of the Pennines, we turn to those on the east. In the north, occupying most of Northumberland and Durham, and of which the industrial life centres on the valleys of the Tyne, Wear, and Tees, is a region which may be called Northumbria.

Northumbria, or North-East England, is bounded on the west by the Pennines, but the boundary is ill-defined, and in the south is best taken at the western limit of the coalfield. The northern limit is well-defined, for the Cheviots approach closely to the coast near Holy Isle and separate Northumbria from the Tweed Basin, whilst on the south the natural limit is formed by the Cleveland Hills. Carboniferous rocks cover most of the region, and over large areas yield but a poor soil; agriculturally the younger soils of the lower Tees basin afford the best soils, and this region is of

importance in supplying agricultural and especially dairy produce to the industrial centres.

The industrial development has been based on the exploitation of the coalfield, which resembles that of Cumberland, but differs from most of the English coalfields in being situated along the seaboard. Since the early days of mining much of the coal has been exported. When there was a large export of coal from Britain this field supplied two-thirds of the total. At the present time much of the coal is sent by sea to London and the south coast. The shipbuilding industry owes its early growth to the need for ships for the shipment of coal; the iron and steel industry to the early utilisation of local "blackband" iron ores. Northumbria benefited greatly from the great railway development of the middle of last century. To this day it remains a leading centre for the manufacture of locomotives.

(a) Tyneside.

The Tyneside industrial region consists of a series of towns with a total population of a million, strung out along both banks of the lower Tyne for about 15 miles from the mouth. Newcastle is the focus; facing it is Gateshead; Tynemouth and North Shields lie to the north of the Tyne mouth, South Shields to the south. Other towns are Wallsend and Tyne Dock. The Tyneside rivals the Clyde as a centre of Britain's shipbuilding industry; the local iron and steel works supply the shipbuilding yards and engineering workshops. Cheap coal and waste gas from the iron furnaces led to the development of glass and chemical works, whilst the smelting of lead has long been important.

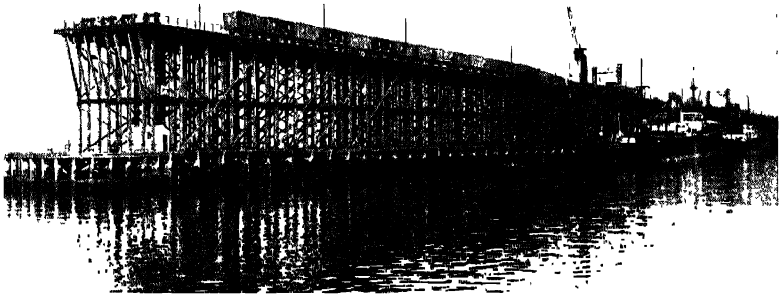
(b) The Wear.

It has not been possible to dredge the Wear as the Tyne has been dredged, and so industrial development is concentrated in Sunderland, which has an active coal export trade and imports mine-timbers and also builds cargo-vessels. The cathedral city of Durham is on the Wear.

(c) Teesmouth and Tees-side.

Tees-side lies to the south of the coalfield, and its development as an industrial region only dates back a hundred years.

Stockton developed as a coal-exporting port, but it was not till the 'fifties of last century that Middlesbrough utilised the nearby Cleveland ores and developed so rapidly that to-day the region, using both the low-grade Cleveland ores and imported haematites, produces from a quarter to a third of the iron made in Britain. Various iron-using industries have developed; the slag is utilised as road metal, whilst the discovery of salt in the rocks north of the Tees has led to a rapid development of chemical manufactures at Stockton and the Hartlepoons and the great works of Imperial Chemical Industries at Billingham and near Middlesbrough. Darlington is famous for steel bridges.



(Photo. Courtesy of Blyth Harbour Commissioners.)

FIG. B 47.—View of “staiths” for loading coal direct to holds of steamers.

Notice the coal wagons high above the level of the decks of the steamer, so that the coal can be tipped down chutes into the steamer's holds.

THE YORKSHIRE REGIONS

The country lying east of the Pennines and stretching to the North Sea, and comprising most of Yorkshire with adjoining parts of Nottinghamshire and Derbyshire, does not form a single geographical region as does Lancashire to the west of the Pennines. Actually there are at least six regions:

(a) The Yorkshire-Nottinghamshire Coalfield, with the great

woollen districts in the north and the Sheffield steel district in the south.

(b) The level, fertile Vale of York.

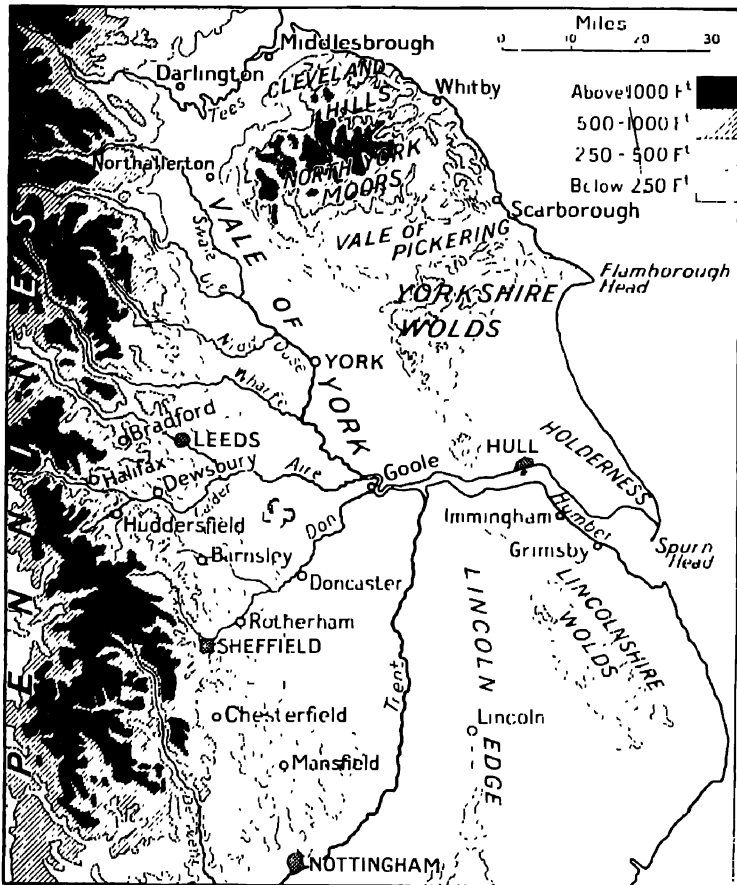


FIG. B.48.—Natural Regions of Yorkshire.

- (c) The North York Moors, including the Cleveland Hills.
- (d) The Vale of Pickering.
- (e) The Yorkshire Wolds.
- (f) Holderness and the Humber Region.

The relationship of these regions is roughly shown in Fig. B.48.

(a) The Yorkshire-Nottinghamshire Coalfield.

On the eastern flanks of the southern Pennines lies the greatest coalfield in Britain, extending for over 70 miles from north to south, from the Aire Valley to the Trent lowland. On the west and north the field is bounded by the older Millstone Grit of the Pennines; to the east the Coal Measures dip under newer rocks, and the "hidden coalfield" to the east forms a very important part of the whole. Though the Coal Measures are continuous from north to south, industrial development has distinguished three areas.

In the north is the "West Yorkshire Coalfield" and the great woollen district. The woollen towns are nearly all in the valleys of the Aire and Calder. Leeds lies where the Aire valley opens out on to the plains and is the focus of the whole district. In the same way as Manchester is the focus of the cotton-spinning district of Lancashire, yet itself plays an unimportant part in the actual spinning, so Leeds is not primarily a woollen town, but is engaged in the work of distribution, in engineering, and the making of clothes. Bradford is the centre of wool combing and worsted; Halifax makes carpets and heavy woollens; Huddersfield specialises in fine cloths; Dewsbury in "shoddy." The early rise of the woollen industry in Yorkshire was determined very largely by the suitability of the lime-free waters from the Millstone Grit (*not* from the limestone areas of the Pennines) for scouring and dyeing.

Farther south is the "South Yorkshire Coalfield" with its focus at Sheffield. Iron smelting from local ores was carried on from an early date. Water power from the Pennine streams and hard sandstones suitable for grindstones encouraged the cutlery trade. Gradually there was a concentration of the iron and steel works in Sheffield itself, which led to the world-famous cutlery industry.

Sheffield no longer smelts iron ore, but obtains iron from Cumberland, Middlesbrough, and abroad. It is noteworthy that Sheffield does not lie on any well-marked natural route. Other iron centres are Rotherham, Doncaster, Barnsley, and

Chesterfield. The concealed coalfield has been proved roughly as far east as the Trent.

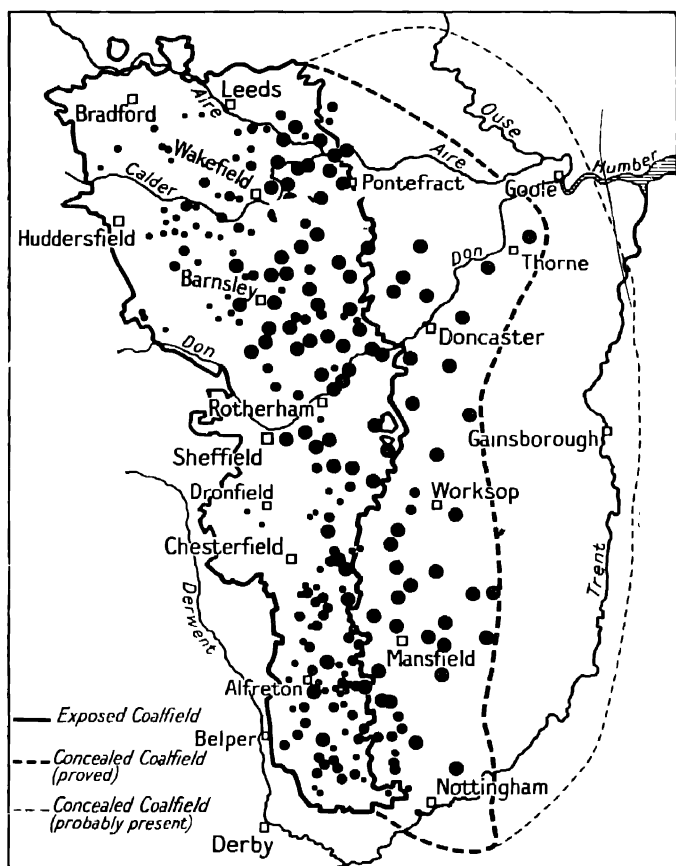


FIG. B.49.—The Collieries of the Yorkshire Coalfield.

The dots are collieries; the smallest dots represent those employing less than 100 men, the largest those employing more than 1,000.
Notice that a very large part of the production is in the hidden coalfield

The southern part of the coalfield, lying mainly in Nottinghamshire, has not given rise to the same degree of industrialism. An important centre is Mansfield, whilst Nottingham, with its lace, hosiery, and leather industries, lies near the southern end

of the coalfield in the Trent valley. Iron pipes are made at Ilkeston.

(b) The Vale of York.

The heart of Yorkshire is occupied by a great plain stretching for 60 miles from north to south and occupying on the south a width of 30 miles between the foothills of the Pennines on the west and the scarps of the Jurassic rocks on the east. On the north it narrows to 10 miles in the Northallerton Gap, leading to the Tees Basin, on the south it stretches to the marshes which once bounded the Humber. The soils are mainly glacial and alluvial—there are stretches of light sands alternating with glacial clays—but the ancient marshes have been drained and the extensive flooding of rivers prevented. As a whole the Vale of York is a fertile agricultural region, with a rainfall of 25 to 30 inches. It is the northernmost area where wheat is an important crop, and there are numbers of small agricultural villages, but the centre of the region and its great market town is York. For more than a thousand years before the Industrial Revolution York was the largest town in the North of England. It lies at the crossing place of the north-south waterway of the River Ouse which was navigable by small sea-boats as far as York, and an east and west roadway formed by a low sandy ridge—an ancient moraine marking a stage in the retreat of an ice-sheet. It was the first site on the river where there was land sufficiently above flood level for a town to be built, and hence the Romans established their military capital of Britain (Eboracum). It remains the ecclesiastical capital of northern England, though smaller than half a dozen of the industrial towns of Yorkshire.

South of the Humber the Vale of York merges into the level agricultural lands of the Isle of Axholme, and then into the Trent valley of Nottinghamshire.

(c) The North York Moors.

Properly speaking the North York Moors form the northernmost portion of the Jurassic scarplands of south-eastern England. The dip of the rocks is very slight, so that the region may be described as a flat-topped plateau of Jurassic rocks. Where the hard sandstone beds which form the surface

layers have been cut through, steep-sided valleys are formed and are very characteristic. The scarps are particularly well marked on the north and north-west. One of the hard bands is the famous Cleveland iron ore which is mined chiefly in the northern part of the hills and sent almost entirely to the Tees-side region. The well-known seaside resorts of Whitby and Scarborough lie on the coast of north Yorkshire.

(d) The Vale of Pickering.

This small but well-marked region was once the bed of a glacial lake. Most of the oval region is now well drained and occupied by rich arable land with a black soil like that of Fenland but there are still wet pastures towards the centre. The villages are found on the drier margins of the old lake basin.

(e) The Yorkshire Wolds.

Just as the North York Moors are the northernmost part of the Jurassic Scarplands, so the Yorkshire Wolds form the northernmost extension of the chalk lands. The country resembles the Lincolnshire Wolds. Until about 150 years ago the whole was devoted to sheep, but now turnips, clover, barley, and wheat are grown.

(f) Holderness and the Humber.

Holderness is a low-lying peninsula covered with glacial deposits. All the old swamps and marshes have now been drained and nearly the whole peninsula is cultivated. Wheat is the chief crop, barley and other crops are also grown. The region may be regarded as the northernmost portion of the rich cornlands of eastern England. The North Sea has worn away large areas of land between Flamborough Head and Spurn Head, but in the mouth of the Humber much land has been regained from the sea. In great contrast to the rural country of Holderness is the great port of Hull. Hull is essentially the eastern gateway to the industrial regions of Northern England, but the surrounding country has not been industrialised as in the case of Liverpool. Hull grew up as a port of trans-shipment between river and sea-borne traffic, and the inland waterways of its hinterland are still of considerable importance. Hull has not now the monopoly of the

Humber trade; Goole is accessible to small steamers, and on the south side of the estuary is the fishing port of Grimsby and also Immingham, which is the creation of the railways.

WALES

Geographically Wales is essentially the hill country to the west of the English Midlands. The greater part lies at an elevation of more than 600 feet above sea-level, a few peaks rise to over 3,000 feet, including Snowdon (3,560 feet), and Carnedd (3,464 feet), but others are rather lower, including Plynlimmon (2,488 feet), and Cader Idris (2,927 feet). North Wales and much of Central Wales consist of ancient sedimentary rocks resembling in age and character those of the Southern Uplands of Scotland and the Lake District. There are also, notably in Anglesey, tracts of still older rocks resembling those of the Scottish Highlands, whilst many of the higher peaks in Wales are built up of ancient volcanic rocks. South Wales consists essentially of a great basin of Carboniferous rocks, the Coal Measures of the South Wales Coalfield occupying the centre. The basin is elongated from east to west. In the eastern part of Central Wales, between the Coalfield and the North Wales Mountains, is a broad area occupied by Old Red Sandstone. Part of this forms one of the wildest and most desolate upland areas in Britain—the Brecon Beacons and Black Mountains—but the eastern part, ranging into Herefordshire, is smiling orchard country celebrated for its apples. There is a small fragment of South Wales, called the Vale of Glamorgan, which is quite different from the rest of the country and really belongs to the agricultural region of lowland Britain.

North Wales was folded by the same earth movements as those which affected Scotland and the Lake District, so that the features have the same Caledonian trend from north-east to south-west. North Wales was greatly influenced by ice action—it has long, straight U-shaped valleys without spurs and numerous little glacial lakes. Among the latter are numerous “corrie” lakes which occupy little basins high up

the mountain sides from which the glaciers of old took their rise. The beautiful Snowdonia region is now a National Park.

Like the other highland areas of the British Isles, Wales

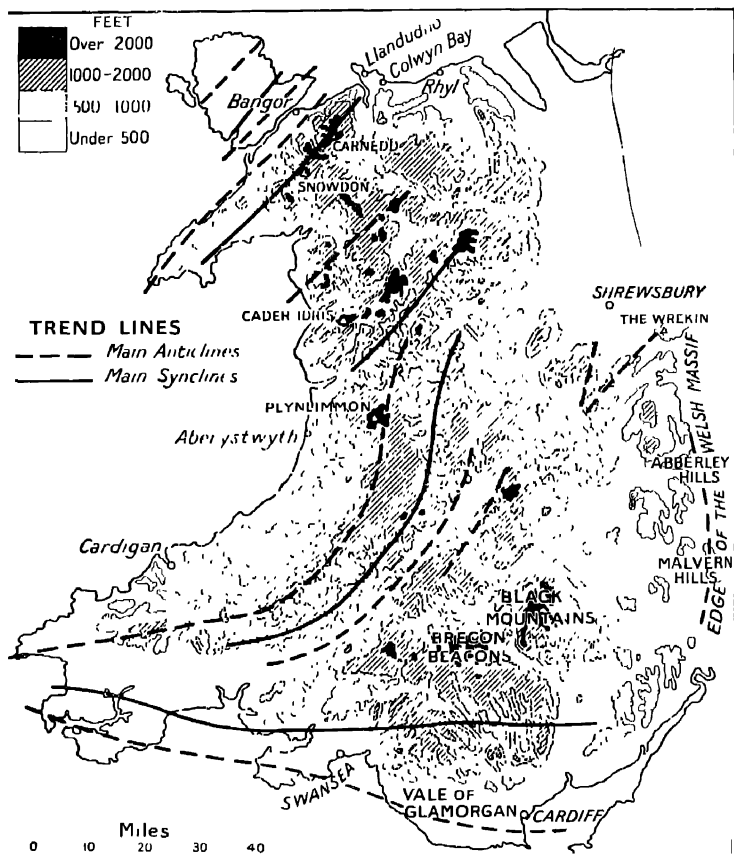


FIG. B.50.—Physical map of Wales showing trend lines.

is a region of heavy rainfall. It lies, however, on the warmer western side of Britain, and despite the height of the mountains snow does not lie for long whilst the valleys of the west coast are sheltered from the cold east winds and enjoy a very mild

climate. Use has been made of this in recent years in the growing of early potatoes in Pembrokeshire.

Wales has never been thickly inhabited; the lowland margins on the west attracted immigrants by sea, the lowland margins on the east invaders by land. The broken-up nature of the country prevented outside influences from dominating the whole; hence the Welsh language and an intense national



(Photo. Frith & Co., Ltd., Reigate.)

FIG. B.51.—Mountains of North Wales

View showing a corrie or "cwm" lake high up on the slopes of Cader Idris

feeling have persisted to this day—in contrast to Cornwall where the Cornish language has entirely disappeared.

Before the Industrial Revolution Wales was essentially an agricultural country. Sheep farming and, secondly, cattle rearing were the leading occupations; small quantities of oats and other crops were grown, and the life of the community centred on the market town. Owing to the dissected nature of the country these market towns were very separated from another. There were numerous little ports round the

coasts, and where small deposits of copper or lead existed each little valley was able to supply its own needs of these metals. Traces of the comparative isolation of the market towns or urban centres of Wales remain to this day: there is no natural capital of Wales. The National Museum of Wales is at Cardiff, but the National Library is at Aberystwyth; the colleges of the University of Wales are scattered at Cardiff, Swansea, Aberystwyth, and Bangor, but the most convenient meeting place is at Shrewsbury—outside Wales altogether.

With the coming of railways and the development of the coalfields the isolation of South Wales was broken up. There has been a drift of population to the south, whilst that of the purely rural parts has declined. The little local industries, including nearly all metalliferous mining, have been killed by outside competition. Only such industries as could be organised on a large scale—such as the extraction of slates in the Festiniog area of the Snowdon Range—were able to persist. The coastal towns of North Wales—Llandudno, Rhyl, and Colwyn Bay—are holiday resorts patronised by visitors from the north of England. Away from these coastal towns and the industrial regions Wales remains agricultural but with an ever increasing emphasis on dairy farming for milk—notably in Carmarthen.

The South Wales Coalfield is unique in many ways among the coalfields of Britain. The field itself is like an elongated “pie-dish” with a high edge of Carboniferous limestone. In the pie-dish are two series of coal-bearing rocks separated by a great thickness of barren sandstone (the Pennant Grit). The upper series is limited in its distribution; the lower series is exposed around the edge of the basin and in the long narrow valleys which are such a feature of the coalfield. In the east of the coalfield these long narrow valleys mostly trend N.N.W. to S.S.E., and are separated by wide, barren moorlands. The mining villages are strung out along the valleys (as shown in Fig. B.52), the houses often climbing far up the steep hillsides. Where these narrow valleys converge and give access to the coast or surrounding lowlands, focal towns naturally sprang up. Hence can be explained the position of Cardiff, Newport,

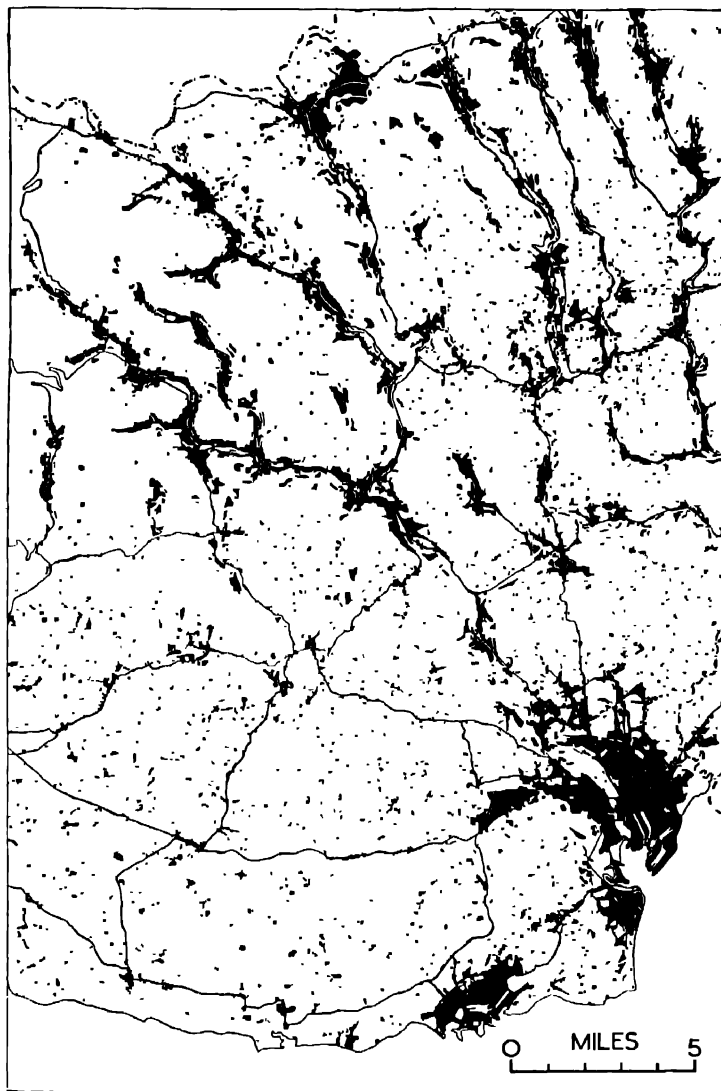


FIG. B.52.—The population of part of South Wales.

Each dot represents a dwelling house and each black area (apart from the main roads which are also shown) the land covered with houses and buildings in the towns. The town in the south-east is Cardiff. Notice how the mining towns and villages of the coalfield are strung out along the narrow valleys, whilst the intervening moorlands are almost uninhabited.

(Map prepared by the Land Utilisation Survey of Britain. Copyright.)

Pontypool, Swansea, and Neath. Route towns, where valleys meet in the coalfield itself, include Merthyr Tydfil and Pontypridd. Another special feature of the South Wales Coalfield is the occurrence of anthracite in the west, whilst the steam coals of the Rhondda Valley in the east are especially suitable

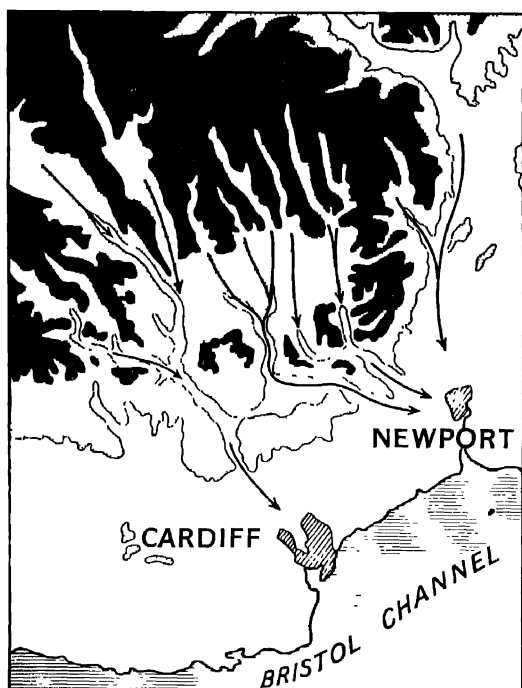


FIG. B.53.—Sketch map showing the position of Cardiff and Newport in relation to the long narrow valleys lying in their hinterlands.

Land over 2,000 feet in black; over 500 feet, dotted. The arrows show how coal is sent to the ports.

for “bunkering” ships. The increased use of oil fuel by steamers and the smaller foreign demand for South Wales coal are two of the main reasons for the decreased output of the coalfield.

The iron industry of South Wales, like that of the Weald of Kent, dates back to the period when local ores were smelted

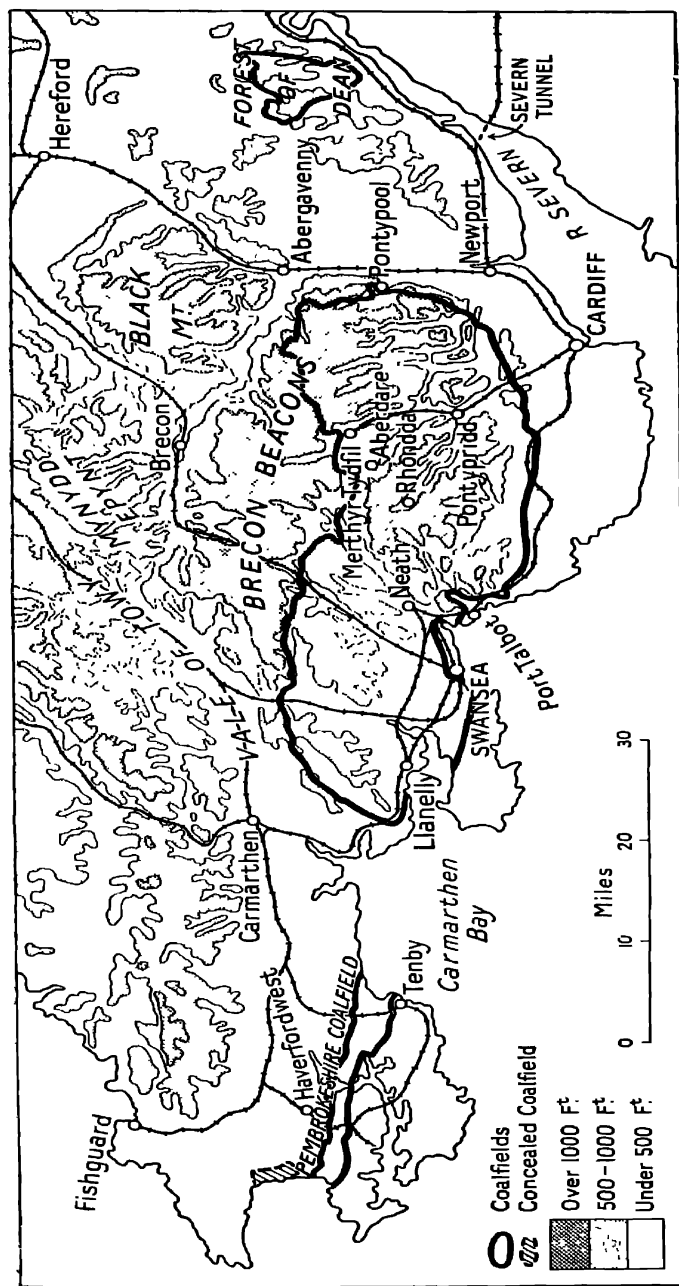


FIG. B.54.—South Wales.

with charcoal from local valley forests. Pontypool and Merthyr Tydfil were early centres. The development of the Swansea-Neath industrial area is much later, though Swansea utilised anthracite for the smelting of imported copper ores at an early date. The smelting of tin, lead, and zinc followed, and then the great tin-plate industry (in the present century). Other metallurgical centres include Llanelli, whilst there are huge modern steelworks at Margam (Port Talbot) and Ebbw Vale.

The small Forest of Dean coalfield is a basin like the South Wales Coalfield in miniature.

Before leaving Wales mention must be made of the coalfields of North Wales with Wrexham and some smaller industrial centres but which send some of their coal to the Lancashire-Cheshire industrial region.

DEVON AND CORNWALL

Unlike the Lake District and Wales, the third of the ancient blocks of the west does not form a rugged mountainous area. Instead, the South-Western Peninsula may be described as a rolling plateau rising but gradually to its greatest heights amongst the "tors" of Dartmoor and Bodmin Moor. It is well known that much of the scenery in the interior of Cornwall is tame and uninteresting, but wherever the plateau reaches the coast there is that magnificent cliff scenery for which the peninsula is justly famous. Devon is more varied, because of the wide stretches of heather-covered moorland and the many picturesque valleys.

The whole peninsula is built up of a much crumpled syncline (just the opposite of the Southern Uplands region of Scotland, which is a crumpled anticline) with an east and west trend, parallel to that of the South Wales Coalfield. The rocks are mostly sandstone and hard slatey rocks. The whole has been penetrated by a number of great granite masses (Dartmoor, Bodmin Moor, Land's End, etc.), each of which gives rise to a tract of higher ground, and the highest parts are formed by tumbled masses—called tors—of granite boulders. Figs. B.55 and B.56 show that, with the exception of Exmoor, all the higher parts of the peninsula are built up of granite. It is

believed that the peninsula was planed down to its present plateau character by the action of ancient seas which must once have swept over it. Indeed, the deposits laid down in these seas are found wrapping round the eastern end of the old mass, and so there is a belt of country in eastern Devon where patches of chalk and other rocks occur and which is thus a transition

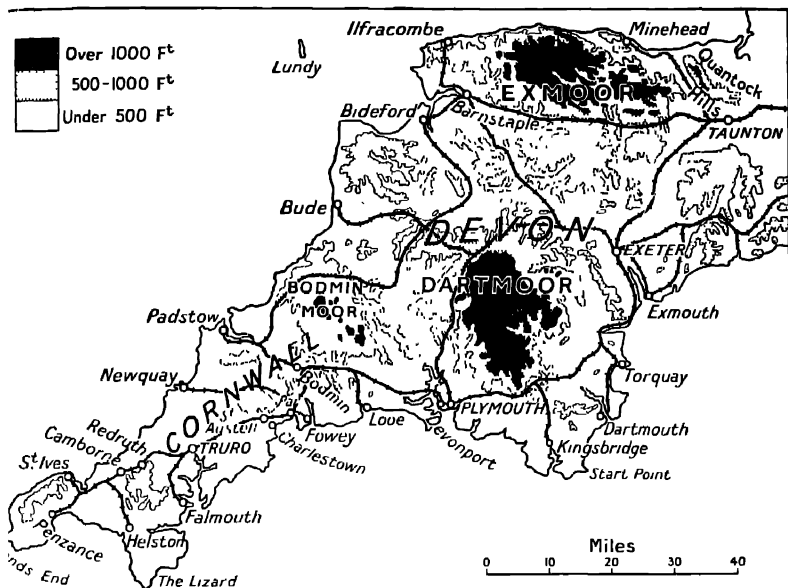


FIG. B 55.—Physical map of Devon and Cornwall.

belt. The Quantock Hills of Somerset may be regarded as a detached mass or "island" of ancient rocks like those of Exmoor. Farther east and also in Somerset are the Mendip Hills, an "island" of Carboniferous limestone on the edge of the Jurassic scarplands. On the northern flanks of these hills lie the small Radstock and Bristol coalfields.

From ancient times Cornwall has been famed for its mineral wealth. The mineral deposits are associated especially with the northern and north-western margins of certain of the granite masses, and the principal mining district is that around

Camborne and Redruth. The chief ores are of tin and copper. Of recent years the mining industry has not been very flourishing; the exhaustion of the deposits and competition from the richer and more cheaply worked ores abroad have been the chief trouble. An important mineral now is china clay, a decomposition product of granite found in gigantic pockets on

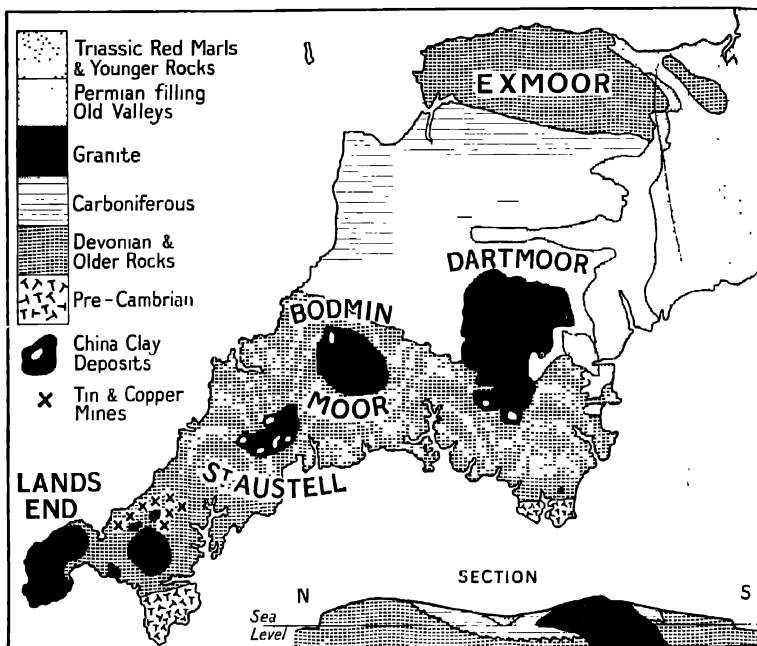
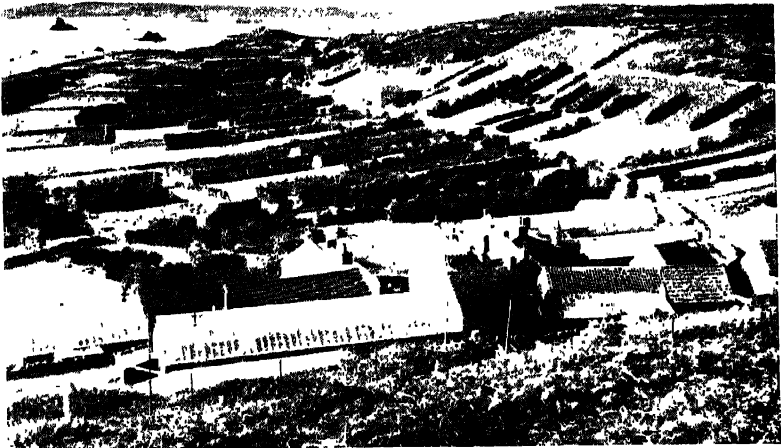


FIG B.56.—Geological sketch map of Devon and Cornwall.

Notice the connection between the high ground in Fig B 55 and the granite masses in this map

the surface of some of the granite masses, especially that of St. Austell. It is dug out and washed and shipped from a number of little ports (such as Fowey, Par, and Charlestown), not only to pottery districts of the Midlands, but also to the Continent. Good slate is quarried when there is a demand for slates (people prefer to roof their houses with tiles now) and granite is quarried in some areas.

In winter the peninsula lies in the mildest parts of the British Isles. It is true that strong westerly winds sweep over the surface of the plateau so that trees have a struggle to exist except in sheltered spots, and fierce waves beat along the rocky coasts, especially along the Atlantic coast, but the effect of the mild climate is seen in the sheltered valleys all along the south coasts. There snow is practically unknown, and even frosts



[Photo: Gibson & Son.]

FIG. B.57.—View near St. Martins in the Scilly Isles.

Showing small fields protected from the wind by walls and used for producing spring vegetables and flowers

are comparatively rare; subtropical plants grow out in the open. In January the Scilly Isles and Penzance are nearly ten degrees warmer than London, and have an average temperature equal to that of parts of the French Riviera, though they do not get so much sunshine.

The effect of the climate is well seen in the agriculture. Much of Cornwall is cultivated and root-crops, in particular, grow well on the richer red soils. Considered as a whole,

the three south-western counties of Cornwall, Devon, and Somerset are great dairying counties. The richness of Devonshire cream is proverbial, whilst Cornwall is worthy to be ranked with Devon, and much of London's best milk comes from Somerset. Geographically, great interest attaches to the special produce of the sheltered valleys of the south of the peninsula and of the Scilly Isles. These specialise in early



[Photo. Fox Photos.]

FIG. B.58.—Gathering the spring flower harvest in Southern Cornwall.

potatoes and other vegetables for the London market, and there is a large trade in cut flowers.

From what has been said, it is not surprising to find very many of the towns and villages of the south-west nestling in the little valleys along the coast. There are many little fishing villages—such as the one shown in Fig. 98—and a number of considerable towns where a larger inlet has afforded a good harbour. There is Penzance, the port for the Scilly Isles; Falmouth with its large harbour; Fowey, which

in the days of Queen Elizabeth had a shipping fleet of the first order and sent many men and ships to fight the Spanish Armada; Plymouth and Devonport with its naval dockyard. The tourist industry is the mainstay of such towns as Exmouth, Torquay, Newquay, Ilfracombe, and Bude. Truro is the cathedral and market town of Cornwall, but Exeter lies on the eastern border of the region, of which it may be described as the gateway.

Having no coal, the South-Western Peninsula has not been greatly affected by the Industrial Revolution. But the construction of railways—notice how their direction is controlled by physical features—has linked the peninsula very closely with the remainder of England.

THE MIDLANDS

The Midlands of England consist for the most part of lowland and occupy a V-shaped area. The southern end of the Pennines fits into the centre of the "V," the left arm of which joins the lowlands of Cheshire and Lancashire, while the right arm joins the lowlands of the Vale of York by way of the broad lower Trent Valley. Geographically the Midlands may be regarded as bounded on the south-east by the first of the "scarps" which make up the scarplands of south-eastern England. On the west the Midlands stretch as far as the edge of the Welsh massif and its prolongations in Shropshire. The point of the "V" stretches to the Severn estuary. The most important of the geological formations in the Midlands is the Upper Trias or Keuper Marls though a mantle of glacial sands, gravels and boulder clay often hides the marls. The soils vary from light to heavy accordingly, but are usually red and generally excellent for cattle pastures and for cultivation. Very similar to the Keuper Marls are the Old Red Marls of Herefordshire. These also give rise to lowlands. The Lower Trias or Bunter is a formation of sandstones which gives rise to rather higher and more barren country, such as the Cannock Chase plateau. The whole of the Trias was originally laid down in a shallow inland basin under almost desert conditions

(compare the Great Salt Lake of Utah at the present day), hence the deposits of salt associated with the Keuper. The Triassic deposits are found wrapping round masses of older rock which formed islands in the old lake basin. The "islands" include the small coalfields of the Midlands, and since they give rise to industrial areas in the midst of country otherwise agricultural they will be considered separately, together with the "islands" of still older rocks.

The "Islands" of Old Rocks in the Midlands.—These islands of old rock are best remembered in relation to the southern end of the Pennines. Taking a point at the southern end of the central limestone core of the Pennines—just west of Derby—we can draw radiating lines each passing through one of the old islands. This has been done in Fig. B.59.

(a) *Charnwood Forest* lies to the south-east of the Southern Pennines. It consists of very ancient rocks—comparable in age with those of the Highlands of Scotland, though all but the highest hills of the ancient island have been covered with Triassic deposits. But the geology makes Charnwood Forest quite different from the surrounding country. There are pretty wooded hills and winding leafy lanes, and the whole area is one of the playgrounds of the Midlands. Some of the old rocks are quarried for road metal which is used all over southern England.

In the valley to the south-east of Charnwood lies Leicester, an old market town in the centre of sheep-rearing and cattle country. The Leicestershire breed of sheep is world famous, and it is not difficult to see how Leicester came to have its staple industry of hosiery or "knitwear," originally from the fine local wool.

(b) *The Leicestershire Coalfield* lies next to Charnwood Forest on the west. It is one of the few coalfields of England which has not given rise to an extensive industrial area. The coal towns of Coalville, Ashby-de-la-Zouch, etc., are still quite small.

(c) *The Nuneaton Ridge*, a narrow ridge of ancient rocks similar to those of Charnwood Forest, lies south-west of the Forest. On its western flank lies

(d) *The Warwickshire Coalfield*, sometimes called the Nuneaton Coalfield. Nuneaton and Tamworth may be

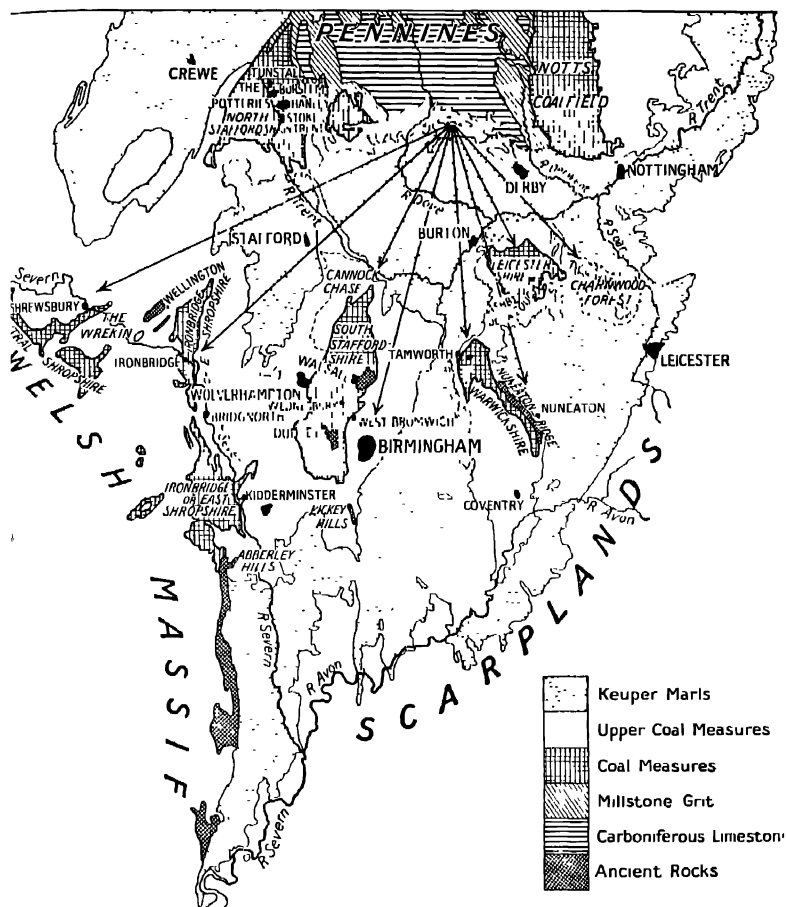


FIG. B.59.—The ancient islands of the Midlands.

called the foci of the coalfield, but the great industrial town of this region lies to the south of the coalfield itself. This town is Coventry—associated with bicycles, motorcars, artificial silk, and latterly with aeroplanes.

(e) *The Lickey Hills* are a very small island of ancient rocks like those of the Nuneaton Ridge, south of Birmingham.

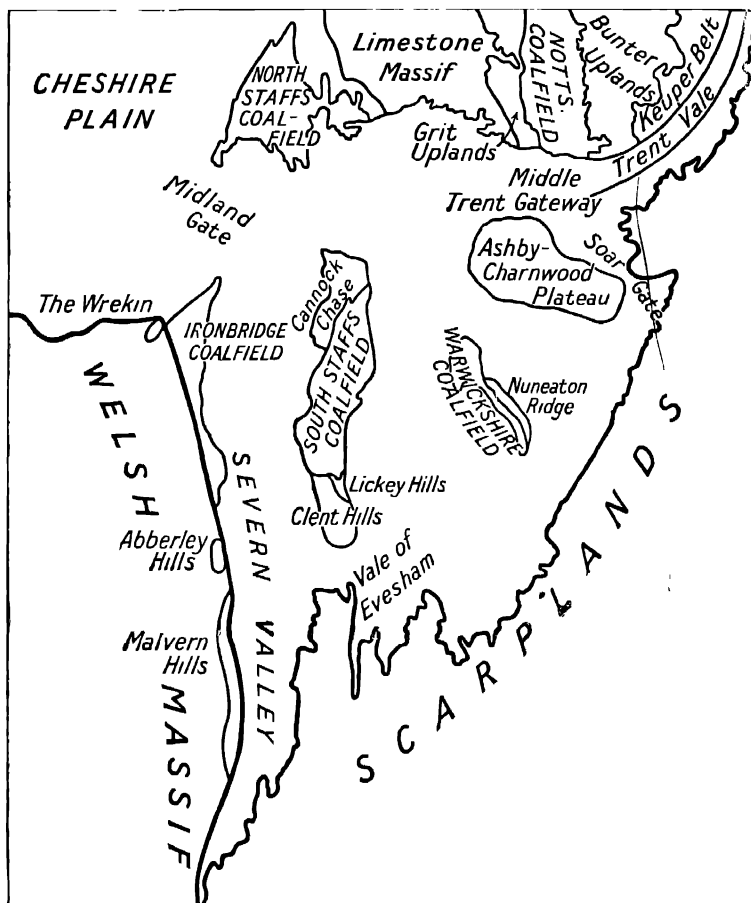


FIG. B.60.—Key to the minor regions of the Midlands.

(f) *South Staffordshire Coalfield*.—This large and important coalfield lies immediately to the north of the Lickey Hills. The northern part is a broad plateau, continued northwards by Bunter sandstones and known as “Cannock Chase.”

Associated with this coalfield is the famous "Black Country." But the Black Country started to get black long before the development of the coalfield, and that is at least one reason why the greatest city of the Midlands, Birmingham, is not actually on the coalfield itself. The early function of Birmingham was that of a market town in the heart of an agricultural country, and it was the demand for horseshoes, nails, chains, and agricultural implements which first encouraged their manufacture in Birmingham—a manufacture made possible by the plentiful supply of charcoal from the forests of Cannock Chase. Thus Birmingham was an "iron town" in the days of the Tudors. Then followed the amazing development of the coalfield. The famous "Thick Coal" was easily mined (up to 30 feet thick in places and near the surface); with it occurred bedded iron ores; near by the limestone hills of Dudley gave the necessary flux. Birmingham a hundred years ago became the centre of the English canal system; the iron industry of England was concentrated in the South Staffordshire Coalfield, and such centres as Wolverhampton, Walsall, Wednesbury, Dudley, and West Bromwich became great towns. But the character of the Black Country has changed, and is still changing. Little iron ore is now mined, and it is expensive to bring iron ore by railway so far to the interior. The Black Country has turned its attention to the manufacture of a great variety of metal articles requiring little raw material—nails, screws, tools, domestic utensils, motors, cycles, wireless and electrical apparatus. Birmingham itself has developed even further, and has important manufactures of artificial silk, food, and drink. It is also the chief centre in the country for the manufacture of non-ferrous metals (copper, brass, aluminium, etc.) as well as jewellery.

(g) *The Ironbridge and Forest of Wyre Coalfield* (East Shropshire Coalfield) is a long narrow coalfield stretching southwards from Wellington. Its two main centres are Ironbridge and Bridgnorth, both on the Severn.

(h) *The Wrekin*, a hill of ancient rocks near Wellington, may be regarded as an extension of the old rocks of Wales, for it is part of the area of old rocks which occupies central Shropshire.

(i) *The Central Shropshire Coalfields*, south of Shrewsbury, are small and unimportant.

(j) *The North Staffordshire Coalfield* (or the Potteries) lies on the western flanks of the southern Pennines. Iron ores occur in this coalfield and have given rise to an important iron industry, but the area as a whole is remarkable for the concentration here of the manufacture of pottery, earthenware, and china of all types. Clays suitable for all the coarser wares are abundant and easily quarried locally, though material such as china clay for finer types is brought from Cornwall. The city of Stoke-on-Trent (now including Burslem, Hanley, and Tunstall), is the chief centre.

Having now dealt with the islands of old rocks which give rise to most of the industrial areas of the Midlands, it remains to note a few points about the surrounding regions of Triassic rocks. Dairying occupies an important place, with market gardening in areas of lighter soil. Especially famous are the market gardens and orchards of the Vale of Evesham. The rich red soils of the central plain of Herefordshire, famous especially for their cider-apple orchards, lie to the south-west of the Midlands, separated from them by the ridge of ancient rocks of the Malvern and Abberley Hills (see Fig. B.50).

Amongst towns in the Triassic belt not already mentioned may be noted Burton, famous for its breweries, the local hard water containing much gypsum being especially suitable. Derby is essentially a route town—a fact reflected in its railway works and the factory where Rolls-Royce cars are made—controlling the east-west route along the southern end of the Pennines and the routes into the heart of the Pennines. The great railway centre of Crewe lies in the Cheshire plain guarding the route from the Midlands. Stafford is at the northern end of Cannock Chase. In the south the carpet industry of Kidderminster was obviously connected with the old local supply of wool. The outlet of the Midlands to the south-west, leading to the port of Bristol, should be noted, though comparatively little of the trade moves in this direction. Bristol has been associated since early days with West Indian and American trade, and to this day is connected with sugar,

tobacco, cocoa, chocolate, and bananas as well with the import of grain and meat.

THE SCARPLANDS OF THE SOUTH-EAST

Although including in its midst the great metropolis of London, the south-east of England is pre-eminently the agricultural region of Britain. It has already been pointed out that the whole of the south-east is occupied by a succession of younger sedimentary rocks. Over large areas these dip to the south-east and so give rise to a succession of hills or ridges where the harder beds crop out and valleys where the softer rocks occur. The hills usually have a steep scarp slope on the one side (the north-west) and a long dip slope on the other, as shown in Fig. B.61. Thus a succession of limestone or sandstone ridges and clay vales occurs as a broad belt across England from Yorkshire through Lincolnshire to Somerset and Dorsetshire. The belt is interrupted by the broad stretch of the Fenlands which will be separately described. The first "scarp" is usually a small one, formed by thin limestones in the lower part of the Lias, and it overlooks the Triassic plain of the Midlands. Then there is a broad vale of Lias Clays, succeeded by a scarp due to hard beds in the middle or upper part of the Lias. Then the beds are more irregular and differ from place to place. The scarps swing about in different directions, die away, and start again. In Gloucestershire and neighbouring counties is a thick limestone, the Great Oolite, which gives rise to the important scarp of the Cotswolds. But the last of the scarps is the greatest of them all. It is formed by the chalk. The chalk stretches from Yorkshire (where it forms the Yorkshire Wolds) through Lincolnshire, as the Lincoln Wolds, then as the low hills on the borders of Norfolk and Cambridgeshire, then along the East Anglian Heights and the Chiltern Hills, crossing the Thames at the Goring Gap, then forming Salisbury Plain, and so to Dorsetshire. The chalk occupies very large areas in the south-east but is interrupted by tracts of older and younger rocks, and there are four areas there which must be described separately—

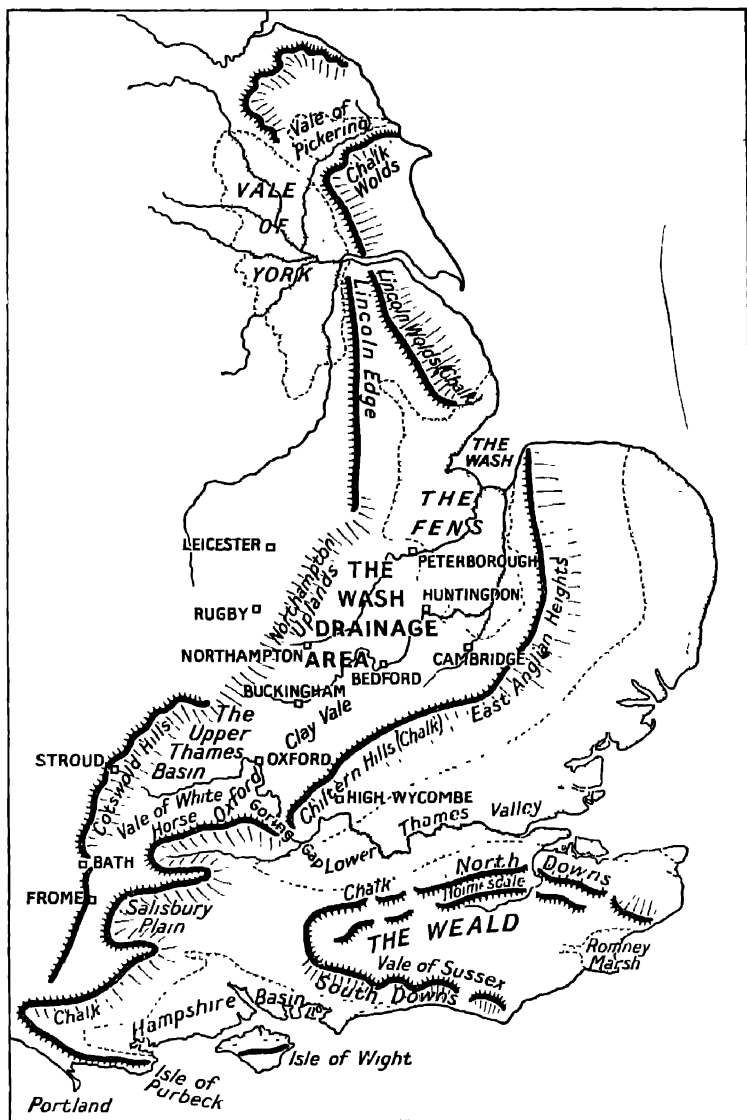


FIG. B 61.—The South-East of England.

East Anglia, the London Basin, the Weald, and the Hampshire Basin.

Returning now to the Scarplands proper, it is broadly true that the clay vales are mainly suited to permanent grass, and hence form cattle country especially for dairy cattle, while the uplands support grassland suitable for sheep pastures or arable land where the soil is richer. It is in this part of England that one sees the "close" rich country of small fields separated by hedgerows and cut up by scattered fragments of woodland which is so essentially "English." Special importance attaches to the gaps through the scarps, and most of the towns of the Scarplands are near a gap. Notice how the Humber breaks through; notice how Lincoln guards the Witham gap, Bath and Bristol the very important one of the Avon much farther south. In the Bristol area coalfields are worked, partly below the Jurassic rocks.

The smelting of the Jurassic iron ores is an important industry in Northamptonshire where the new town of Corby has grown up and in north Lincolnshire where there is the new town of Scunthorpe.

Amongst the towns of the Scarplands, Northampton (why the boot and shoe industry?), Bedford, Aylesbury, and Oxford all lie in clay vales. The broad Plain of Somerset (with the well-known dairying country around Taunton) lies between the Scarplands and the old rocks of Devon and Cornwall. Nearly all the towns one might mention have served as market towns for the surrounding country. Certain industries, started as cottage industries, have survived—such as the "broadcloth" of Stroud and Frome using wool from the neighbouring Cotswolds. Bath is an interesting example of a spa where a natural hot spring was used by the Romans and has been valued for its curative properties ever since.

The great flat plain which surrounds the Wash was once a wide tract of marshland covered with dense masses of rushes and sedges, intersected by sluggish streams and shallow lakes, here and there with patches of firmer ground with thickets of willow and alder, but the whole liable to flooding in winter. It formed a barrier to the movement of man, though its few

islands were refuges of the persecuted (note the position of Ely). But practically the whole has been drained and now forms one of the richest stretches of agricultural land in England. On the seaward side equally rich land has been reclaimed from the shallow waters of the Wash. It is the great potato-growing region of England; other root crops, including sugar-beet, flourish, whilst wheat, barley, and oats are also staple crops and much market gardening, fruit farming, and flower farming is carried on. The rainfall is less than in most parts of England, the summer sunshine greater, the winter cold more intense. There are no towns of any size in Fenland: Cambridge, Huntingdon, and Peterborough (one of the greatest brick-making centres in England) lie near its borders.

EAST ANGLIA

East Anglia corresponds roughly with the counties of Norfolk and Suffolk. Chalk underlies most of this tract, but is so thickly covered with glacial and other deposits that East Anglia is very far from resembling chalk country. The region may be regarded as stretching as far south as the London clay country—once forested—of Essex. The character of East Anglia varies mainly according to the nature of the surface deposits. Overlooking Fenland is a tract of poor sandy soil giving rise to barren, heathy country known as Breckland which has now been planted with millions of softwood trees so as to make it the largest forest in England. Most of the remainder of East Anglia is agricultural land, with wheat, barley, and root crops. Where the soil is sandy and poor there is much common land and sheep pastures; where heavy boulder clay occurs there is also less cultivation. The richest region is in the north-east of Norfolk, where the cornlands of East Anglia are seen at their best. A small but well-known region is that of the “Norfolk Broads,” where the wide shallow stretches of water afford safe and pleasant tracts for yachting, and the neighbouring marshy pastures are excellent for grazing.

The principal inland centre of East Anglia is Norwich; in

the Middle Ages the seat of Britain's woollen industry (note the significance of local sheep and proximity to Flanders) it is now associated with the boot and shoe industry and with the preparation of mustard and various foodstuffs. On the coast are the fishing ports of Yarmouth and Lowestoft, as well as many popular seaside towns.

THE LONDON BASIN

The London Basin is a broad synclinal basin with a wide chalk rim, and its central portion is occupied by sands and clays, valley gravels and alluvium. The most important of these young sedimentary rocks which fill the basin is the London Clay. The chalk hills which bound the basin in the north-west are the Chiltern Hills, those on the south are the North Downs. The two lines of hills are arranged like the two arms of a V and eventually meet in the west of the basin, where the River Thames cuts through them in the well-known Goring Gap. Of special importance to London are the gaps, usually occupied by rivers, through the bordering lines of chalk hills, since nearly all the main roads and railways out of London pass through them. On the south, from east to west, they are as follows:

- (a) The Medway Gap, where the Medway emerges from the Weald to empty into the Thames estuary—a gap guarded by Rochester with its Norman castle and Chatham with its modern naval dockyard.
- (b) Shoreham or Darent Gap, leading to Tonbridge.
- (c) Croydon, controlling the Caterham and Reigate Gaps.
- (d) Dorking or Mole Gap, followed by the main Worthing road.
- (e) Guildford or Wey Gap, used by the old Portsmouth road.
- (f) Basingstoke Gap, used by the Salisbury road.
- (g) Kennet Valley, leading to Bristol.

On the north, from west to east, the chief gaps are:

- (a) Wendover Gap, leading to Aylesbury.
- (b) Dunstable Gap, followed by the main road to Chester.
- (c) Stevenage Gap, leading to Bedford.

The London Basin is open to the north-east, but in ancient days the London Clay region of Essex was thickly clothed with forest—Epping Forest and a few small tracts are all that now remain.

In the broadest possible way it may be said that the chalk downs around London are, or were, sheep-farming country, with arable farming where patches of gravel or loam ameliorate the conditions due to a pure chalk soil. The younger rocks of the basin itself are suitable in the main to arable farming except where large stretches of sandy soil give rise to heathlands with pine woods (Bagshot Heaths of Surrey) or areas of very stiff clay remain under permanent grass or oak woodland. Actually the life of the whole basin is dominated

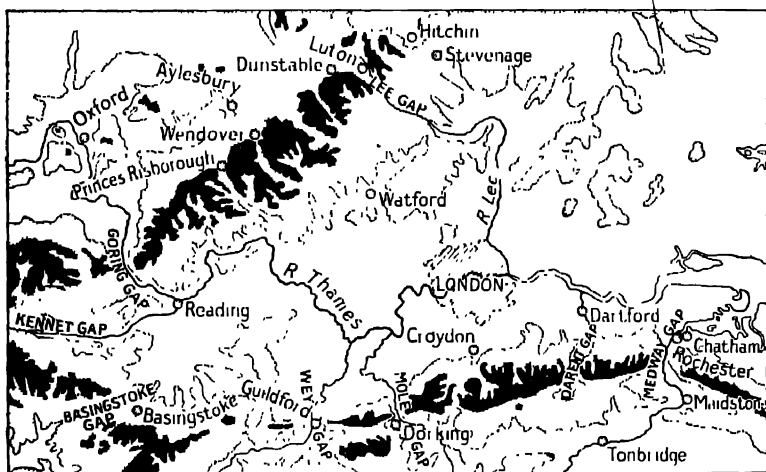


FIG. B.62.—The London Basin, showing gaps through the chalk hills of the north (Chilterns) and of the south (North Downs).

Land over 500 feet, black; over 250 feet, dotted

by that of the capital itself. Residences of daily workers in the metropolis stretch as far as the chalk hills and even beyond them; more and more land is being eaten up in this way. The difficulty of finding land for factories has caused many companies to move their works and offices to one of the small towns within or even beyond the limits of the basin. Thus London's paper is manufactured at St. Mary Cray, at Sittingbourne (where there are facilities for importing and storing the bulky wood pulp); many of London's books are printed at

such outlying towns as Luton, Watford, Colchester, and Guildford, or even (like this book) as far away as Beccles in Suffolk. London's oil is refined far down the Thames estuary at Shellhaven (north) or the Isle of Grain (south); much of London's food is prepared at such centres as Reading and Maidstone; much of London's medicine at Dartford. There has been a big increase in manufacturing industries around London in recent years, with the result that the pressure on agricultural land in the basin has increased. North Kent is very largely occupied in market gardening—supplying vegetables for London's daily needs and fruit for her jam factories. Surrey, with its large stretches of sandy heathland, has a comparatively small farming area. Essex, although one of the driest counties in England, has become a great dairying county because London needs fresh milk. From Fig. B.6 note the position of the hidden Kent coalfield.

LONDON

Occupying the centre of the London Basin and rapidly extending to its northern and southern margins is London, the largest city in the world. Its only rival for number of people is New York.

London was founded as a stronghold or fortress long before the Romans came to Britain. In those days the banks of the Thames were marshy and the river often overflowed its banks. On the north bank there were two small hills which remained above the floods and formed an ideal site for a town, since they were dry and also guarded a crossing-place of the river. On the top of one hill we find to-day St. Paul's Cathedral; the other is still called Tower Hill, for on part of it stands the Tower of London. The Romans built a wall round these two hills, and in the Middle Ages also London was a walled city. Many of the famous streets of London are named after the old city gates. On the west was Lud-gate, overlooking what was then an estuary with an anchorage for fishing-boats—the Fleet. On the north Moor-gate led out on to the "moors," or marshy waste ground. Bishop's-gate and Alder's gate are other names still remaining. At an early date a bridge was

built where London Bridge now stands, and London is still a "bridge town." There is no bridge across the Thames below London.

The City of London occupies roughly the same area—about a square mile—as old walled London. Not many people *live* here now; the city is occupied by offices where people come daily to work. Even until 1878 there was an archway called Temple Bar across Fleet Street which marked the entrance to the City. Every time the Queen wishes to enter

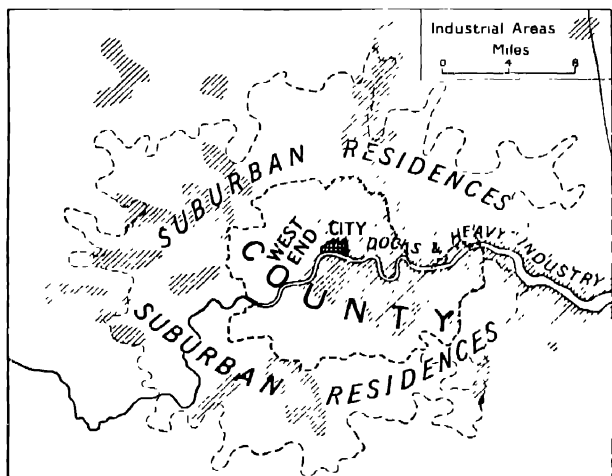


FIG. B.63 —Greater London.

The outer broken line is roughly the limit of the built-up area as it was at the end of the Second World War.

London she is met here by the Lord Mayor, who presents her with the sword of the City.

Surrounding the City is the "County of London." In the County live more than 4,000,000 people. The eastern part of the county, along both sides of the River Thames, is devoted to London's business as a port—the busiest port in the world. The great docks have been dug out of the soft alluvium, and occupy what was once waste marsh. Along the banks of the river are to be found the "heavy" industries and those using materials imported by sea—the gas-works and electricity works (using coal brought by water), flour mills,

sugar refineries, and paper works. Iron works and a motor factory are found at Dagenham; farther down the river are many cement works, using chalk mixed with clay from the river bed.

The East End and the districts to the north, north-east, and south-east are busy, crowded manufacturing areas. London has not one great industry but many small ones. Most important are the making of clothes, wood working (including furniture making), printing, the making of chemicals, paints, varnishes, etc., and small metal goods such as electrical and wireless apparatus.

The West End is the great shopping area, and here are to be found the theatres, cinemas, and many restaurants and hotels, as well as large residential areas where people live. Near Westminster are the many Government offices, as well as the Houses of Parliament and the Royal residence (Buckingham Palace). Remember the winds of Britain; why should the West End be the best part in which to live?

Surrounding the County of London is an "outer ring" which makes up, with the County and City, "Greater London." In the outer ring more than 4,000,000 people have their homes and many travel to their offices in the City every day. So Greater London has more than 8,000,000 people and is still growing rapidly outwards. One of the greatest problems is to prevent London growing bigger still. Already far too much time is wasted in people getting to their work. A number of self-contained New Towns are being built at distances of 20 to 40 miles from London—Crawley, Bracknell, Hemel Hempstead, Stevenage, Welwyn, Hatfield, Harlow, and Basildon.

THE WEALD

The structure of the Weald, which occupies large areas of Kent and Surrey and most of Sussex, may be likened to an overturned boat with the top cut off. The rim of the Weald is the chalk escarpment; denudation has exposed the older rocks in the centre. The western end of the Weald is in Hampshire; the English Channel and Strait of Dover have cut across the eastern part so that the eastern end actually lies in France.

Inside the chalk rim there is usually a narrow clay valley formed by the Gault Clay, then ridges of hard rock formed by the Lower Greensand, then clay valleys, and finally, occupying the centre, forested sandstone hills. Mixed farming is characteristic of much of the Weald; a feature of special interest is the growing of hops. Most of the Weald is strongly influenced by the proximity of London; Dover, Folkestone, and Newhaven are outports of London utilised by cross-channel services (compare Harwich, to the north-east of

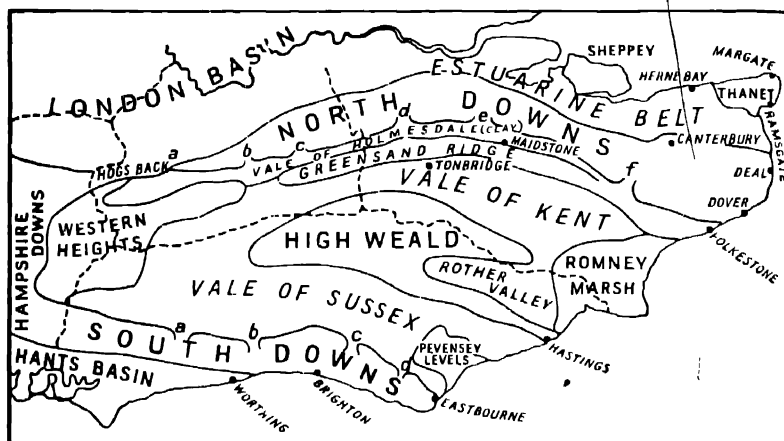


FIG. B.64.—The Weald, showing minor regions. Most of the gaps through the chalk rim, marked by letters, can be identified from Fig. B.65

London); Herne Bay, Margate, Ramsgate, Deal, Folkestone, Hastings, Eastbourne, Brighton, and Worthing are but some of the seaside resorts used primarily by Londoners. On the north-eastern flank of the Weald, in the Stour Gap, is the ecclesiastical capital of England, Canterbury; in the heart of the Weald Maidstone and Tonbridge are leading towns. As with the London Basin, much of the agricultural produce of the Weald is absorbed by London. Some places take advantage of a sunny, southward-facing situation to specialise in certain produce—thus Worthing may be said to have done much to popularise the once rare tomato.

Before leaving the Weald mention must be made of the

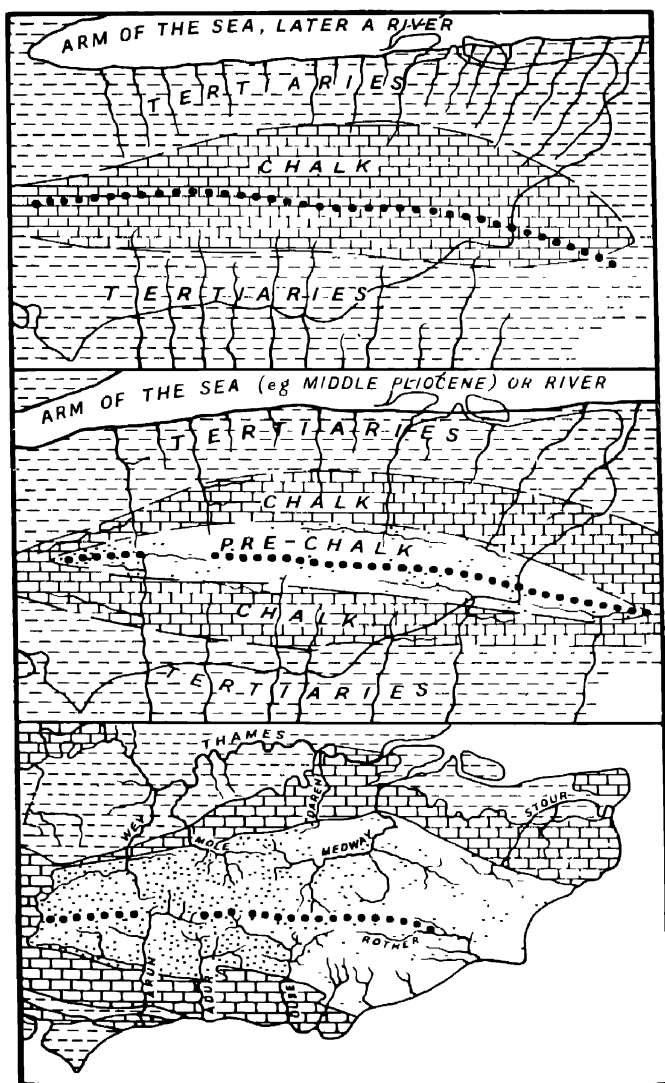


FIG. B.65.—Development of Weald drainage.

The upper diagram shows the position when the Wealden anticline was uplifted in early or middle Tertiary times. The middle diagram shows the chalk cover worn away in late Tertiary (Pliocene) times. The lower diagram shows the position to-day.

classical example it affords of the development of drainage. When the arch (anticline) or dome of the Weald was first uplifted the rivers which flowed directly down the slopes were the "consequent" streams. It is these which have cut gaps in the chalk rim. The tributaries of these rivers, coming in from left and right at right angles, are the "subsequent" streams. Find examples.

THE HAMPSHIRE BASIN

In many ways the Hampshire Basin resembles the London Basin. There is a surrounding girdle of chalk downs and the central region is of later clays and sands. Instead, however, of the basin being open to the sea to the east, its southern chalk rim has been cut through by the sea in two places—at each end of the Isle of Wight. The Hampshire Basin as a whole is largely out of the reach of London's influence, but of its two great towns Southampton and Portsmouth, Southampton is essentially London's outport for the trans-Atlantic and African services, while Portsmouth is the great dockyard for the southern coast. Bournemouth and the sheltered resorts of the Isle of Wight are favourite seaside places; Salisbury Plain, to the north-west of the basin, is one of England's chief military training camps.

THE CHANNEL ISLANDS

Although so near to the French coast, the Channel Islands have so long been under English influence that speech and customs are essentially English. The islands are, however, administered according to their own laws, and are not bound by the Acts of the British Parliament unless specially named in them. The four principal islands are Jersey, Guernsey, Alderney, and Sark. Jersey and Guernsey, the two largest, are thickly populated. They specialise in supplying England with early vegetables, especially potatoes (which occupy half the arable land) and tomatoes, in spring, and in entertaining

visitors from England in the summer. They have given to the world the famous Jersey and Guernsey breeds of cattle.

During the Second World War, from 1940 to 1945, the Channel Islands were occupied by German forces.

THE ISLE OF MAN

Structurally the Isle of Man is most closely connected with Cumbria. It consists in the main of a mass of old rocks with an area of Carboniferous limestone, like that of Cumberland, in the south, and a peninsula of younger red rocks in the north. The principal town is Douglas. The Isle of Man is a popular holiday resort for Lancashire. It has its own parliament (the House of Keys) but is administered in general as part of Britain.

NORTHERN IRELAND

Northern Ireland comprises six counties of the old province of Ulster. It has an area of 3,350,000 acres, or about 5,240 square miles, and a population of just over a million and a quarter. As shown in Fig. B.67 there is in the south a belt of rolling upland country, largely occupied by farms, which is a continuation of the Southern Uplands of Scotland. In the southern part of this area there is a large intrusive mass of granite forming the Mourne Mountains. North of this upland area there is a belt which is really a continuation of the Midland Valley of Scotland, whilst farther north are mountains of ancient rocks like those of the Highlands of Scotland. But the greater part of the north-east is covered by a huge stretch of lava (called basalt), poured out by ancient volcanoes, and which may be called the Plateau of Antrim. Although it is plateau-like at the edge, the centre has sunk so that it is shaped like a saucer. In the hollow in the centre is the largest lake in the British Isles, Lough Neagh, which is however very shallow. The columnar basalt of Giant's Causeway is world-famous. The higher parts of the Antrim Plateau are rough moorland tenanted by sheep, but on the lower lands there is much cultivation. A crop of particular interest is flax, from which

linen is made. Before the outbreak of the Second World War when flax was again grown in many parts of England this was the only part of the British Isles where flax was grown in any large quantity. It is cultivated especially in the broad, fertile valleys of the Lagan, Bann, and Foyle, and here also there are large crops of oats, potatoes and other food crops. The capital and the principal town of Northern Ireland is Belfast, which is also the chief port. Belfast is an important manufacturing centre with a population of 400,000 people; it carries on shipbuilding, using imported iron and steel, flax-spinning, linen-weaving, cotton-weaving, and distilling, as well as various minor industries. Some of the flax-spinning and linen-weaving is also carried out in the small neighbouring towns. Another important town in Northern Ireland is Londonderry (Derry), which has clothing industries. Linen still forms quite an important article of export from the United Kingdom, and practically all the linen exported is made in Northern Ireland.

THE IRISH REPUBLIC

Before 1919 Ireland was part of the United Kingdom of Great Britain and Ireland. In January 1919 Ireland, except the six northern counties, became a separate country called at first the Irish Free State or, simply, Eire. Under the constitution adopted in 1937 Southern Ireland was declared to be a sovereign independent democratic state, now officially known as the Irish Republic. Irish is the first official language but English is spoken generally. The President is elected every seven years. It occupies about five-sixths of the whole of Ireland and includes twenty-six of the thirty-two counties. It has an area, excluding large rivers and lakes, of over 17 million acres, or 26,600 square miles. In 1951 it had a population of nearly 3,000,000, so that the population density is low—only about 110 to the square mile compared with over 650 in England and Wales. The capital is Dublin, with a population of half-a-million, an important manufacturing centre, making beer and biscuits amongst other things. But there are not many other large towns in the Irish Republic. There are Cork

and Limerick, which are ports in the south and south-west; but it is primarily a farming country. It lies in the wetter part of the British Isles and a great deal of it, especially the central part,



FIG. B.66.—General map of Ireland.

All parts black are more than 500 feet above sea-level.

is low-lying land, not very well drained and so having very wet pastures. Much of the land here is occupied by bogs and so cannot be used, but in other parts large numbers of cattle are kept. So Ireland exports live cattle especially to Britain

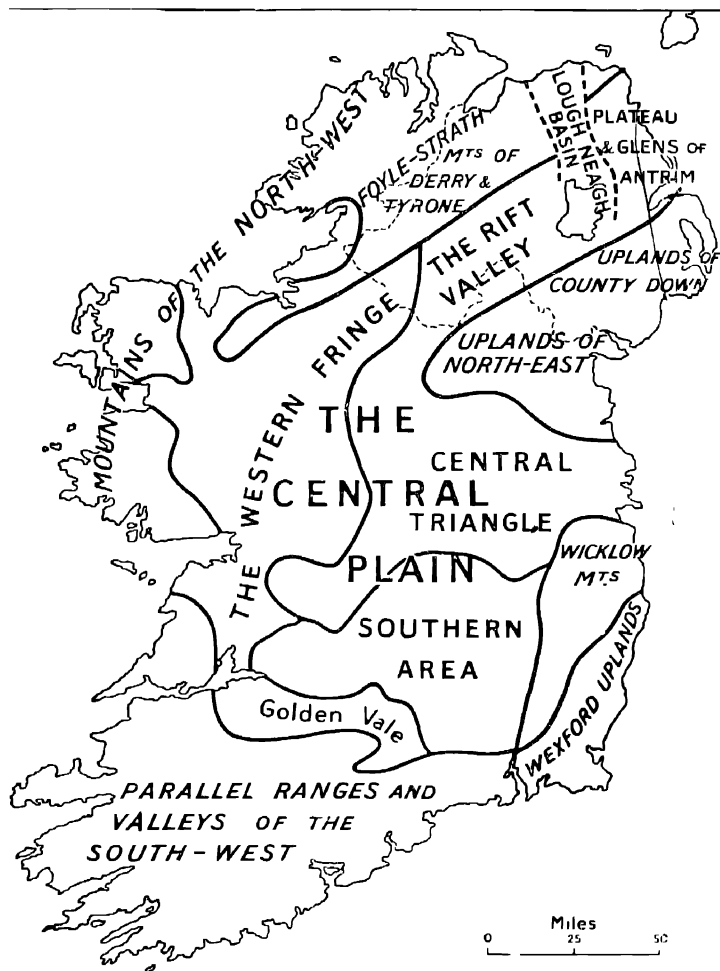


FIG. B.67.—The natural regions of Ireland.

where they are fattened for the butcher or added to dairy herds. To the south-west the cattle are kept mainly for dairying, and Ireland exports huge quantities of butter. Pigs are fed on the skimmed milk, and so Ireland has a bacon industry also. Poultry in turn are fed on the scraps, and so there is an export of eggs. We find, therefore, that the products of the Irish Republic are like those of Denmark—especially dairy produce. It has little or no coal, iron or steel, and so has to import these, as well as most manufactured goods, including clothing. A large part of its trade is through the principal port and capital, Dublin. About half the imports come from the United Kingdom; whilst 90 per cent. of the exports normally go to the United Kingdom.

The Central Plain of Ireland is a wide plain averaging a hundred feet above sea level. Underlying the plain is limestone but this is thickly covered with impervious clays of glacial origin, so that bogs cover very large areas; where bogs are absent the soil is fertile. The farmers' holdings are generally small—more than half are under fifteen acres. The export of live cattle is mainly from the Central Plain. The Shannon is the largest river in the British Isles, and by circumventing the rapids below Lough Derg by a canal it is navigable to Lough Allen. The important scheme of which details are shown in Fig. B.68 utilises the fall of the Shannon to generate electricity for nearly the whole country. The rim of highlands which in general surrounds the Central Plain is breached in the east, so that Dublin is the natural outlet of the plain but shares some of its trade with Dundalk and Drogheda. Limerick

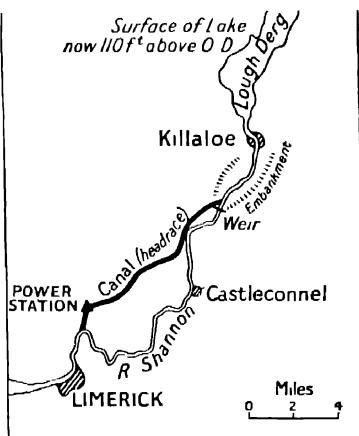


FIG. B.68.—The details of the Shannon hydro-electric scheme.

Showing how the waters of the Shannon river are kept in by an embankment and the waters led through from the weir to the power station.

is the outlet of the Lower Shannon, and is in the midst of very fertile land. Galway is the port of the west.

The Connemara and Mayo Highlands and Donegal in the north-west of Eire have poor thin soils, an excessive rainfall, and are swept by strong winds from the Atlantic. The small population lives in the valleys or by fishing along the coasts.

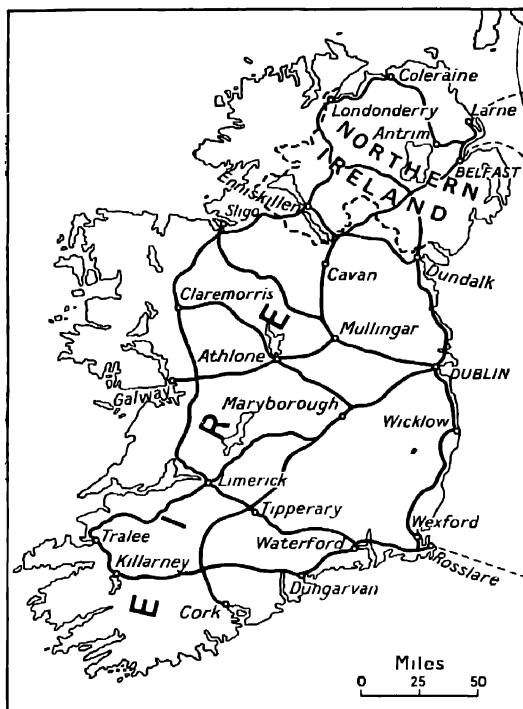


FIG. B.69.—The railways of Ireland.

South-Western Ireland is built up of a series of mountain ridges with an east-north-east—west-south-west trend. In the west the sea has invaded the valleys as long, narrow rias, which form good fishing grounds. Rias differ from fiords in that glacial action has played no part in their formation, and there is no submerged ridge near the entrance. They are, in fact, old river valleys which have been drowned by the sea

owing to a general submergence of the land. The climate of this part of Ireland is very mild, the valleys with their dairy farms constitute some of the most fertile sections of the country, and the beautiful scenery, especially around the Lakes of Killarney, attracts many visitors. Cork has one of the finest

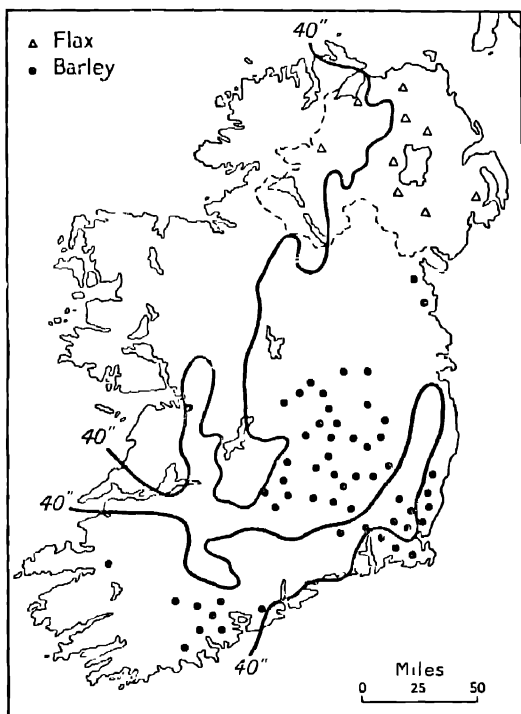


FIG. B.70.—The distribution of barley and flax in Ireland.

Each dot or symbol represents 5,000 acres. Notice that nearly all the barley is grown in the warm, dry south-east where the rainfall is about 40 inches or less, and the average July temperature about 60° F. (see Fig. B.10).

natural harbours in the world, and Cobh (Queenstown), on an island in the harbour, is a port of call for Atlantic liners. There is an important trans-Atlantic airport at Shannon near Limerick.

South-Eastern Ireland is an upland region with a mass of granite forming the lofty Wicklow mountains. The valleys are fertile, and arable farming is of considerable importance.

The harbour of Waterford lies in this region; Rosslare is its outport served by steamers from Fishguard in Wales.

QUESTIONS

1. Describe the chief changes that would occur in the coast-line of the British Isles if the area were (a) uplifted 400 feet, (b) submerged 500 feet.

2. Compare (a) the physical features, (b) the climatic conditions, and (c) the human activities in South Wales with those in Yorkshire.

3. Draw a sketch-map showing the principal canal and river routes of the Midlands of England. What are the difficulties in the way of greater use being made of these for purposes of transport?

4. Write a reasoned general account of the way in which the population of (a) Scotland, and (b) Ireland is distributed with reference to the main regions into which each country may be divided.

5. What geographical advantages, accounting for its greater modern importance, has (1) London had over Winchester, (2) Leeds over York, (3) Crewe over Chester, and (4) Preston over Lancaster?

6. If we imagine Wales and East Anglia to have exchanged places, what modifications should we expect to find in the drainage of southern Britain and in the existing industries of the two areas?

7. Describe, with reference to the produce handled and the ports engaged, the nature of the export trade from the Irish Free State to Great Britain.

8. Give an account of the geographical features, climate, and industries of *either* South Wales *or* the Lowlands of Scotland.

9. Show that the area that is drained by rivers flowing into the Humber Estuary comprises a variety of relief, resources, and industries.

10. Contrast the hinterlands of (a) Limerick and Bristol, (b) Aberdeen and Swansea, (c) Plymouth and Newcastle, with reference to resources, industries, and commercial importance.

11. State fully why so many of the people in the British Isles are engaged in fishing.

12. How has the discovery of coal and iron in Great Britain affected her national life?

13. Which of the natural regions of Scotland would you choose to live in, and why?

14. Describe and account for the chief industries on (a) the Lancashire, (b) the Yorkshire, (c) the Northumberland, (d) the South Wales coal-fields.

15. Write a description of the physical features, geology, and products of the Weald.

16. What are the advantages of the position of Great Britain for (a) European, and (b) world trade?

17. What geographical reasons can you give for the small population and lack of development in Ireland?

THE BRITISH COMMONWEALTH OF NATIONS

In recent years the British Empire has come to be known as the British Commonwealth, a term covering both a world-wide range of countries and many forms of Government. It includes more than one-fifth of the whole of the land surface of the globe and about one-fourth of the world's people. The growth of Britain's sea-power made possible the growth of the Empire and it is the navies, merchant navies and air fleets of Britain and her sister states which maintain contact between the many members of the Commonwealth.

The Commonwealth consists of

- (a) The United Kingdom of Great Britain and Northern Ireland.
- (b) Sovereign states, self-governing and independent, which recognise the Queen both as head of the Commonwealth and as their own Queen. They are Canada, Union of South Africa, Australia, New Zealand, Ceylon and Ghana (formerly Gold Coast).
- (c) The former Indian Empire, now divided into two sovereign states: the Republic of India and the Islamic Republic of Pakistan. They recognise the Queen as head of the Commonwealth, but not as commanding their own allegiance.
- (d) The Federation of Malaya, a sovereign state recognising the Queen as head of the Commonwealth, but owing allegiance to its own head: the ruler of one of the Malay States elected to that position for five years.
- (e) Self-governing Colonies. Example: Southern Rhodesia. Gradually more and more British Dependencies are attaining a greater measure of self-government.
- (f) Colonies and Protectorates administered through the Colonial Office.
- (g) Trusteeship territories, governed at the request of the United Nations. Most were held under mandate from the old League of Nations. Example: Tanganyika.
- (h) Condominia: territories ruled jointly by Britain and another country. The chief example is the New Hebrides (Britain and France).

Some parts of the British Commonwealth were obtained by conquest (*e.g.* Canada); other parts by discovery (Australia); many areas have been added at the request of the inhabitants who desired good rule (Kenya and other colonies in Africa); small parts by purchase or exchange (Hong Kong).

The important thing to notice about the British Commonwealth is the way in which all parts can work together for the

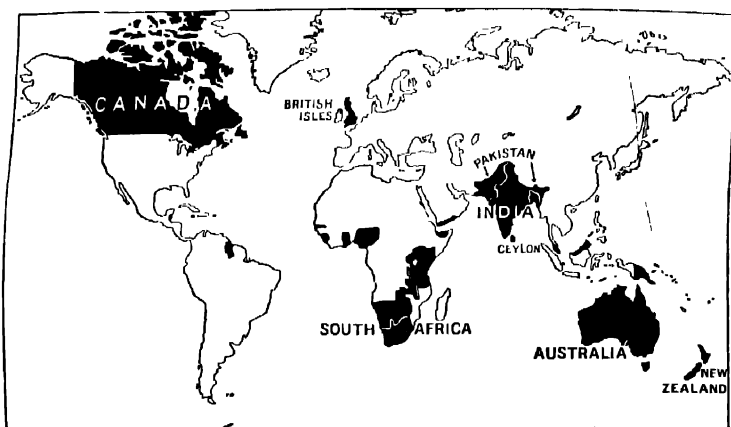


FIG. B.71.—The British Commonwealth of Nations
The Dominions are named.

common good. Some parts supply food, other parts manufactured goods, whilst many of the smaller possessions act as “policemen” guarding the great trade routes

SCANDINAVIA

The large peninsula of Scandinavia is divided between two countries, Norway and Sweden. Although Scandinavia is a peninsula and Great Britain an island, there are many points of resemblance between them. The western coast is extremely indented and fringed by numerous islands (compare Scotland). The inlets are termed “fiords,” they are often deep and with vertical cliffs rising directly out of the water. They are believed to have originated as great cracks in the earth’s crust, along which the hard old rocks were crushed so that excavation by rivers and later by glaciers was easy. A great

the west end

of the mountain ridge, the land slopes gently by a series of steps towards the Baltic Sea. Naturally the longer rivers flow towards the east (compare England). But the mountains of Scandinavia are much higher *than those of Great Britain*. The rivers, flowing swiftly down from great heights, can be harnessed and made to generate electric power; the rivers of Sweden can also be used for floating timber.

The western coasts of the peninsula are bathed by the warm waters from the North Atlantic Drift, and come under the influence of the south-westerlies so the climate is comparatively mild. Although the North Cape is nearly five degrees inside the Arctic Circle, and the most northerly point in Europe, the sea there is never frozen. The mountains of Scandinavia attract a heavy rainfall.

The country west of the mountain divide is Norway, the country to the east is Sweden. Sweden lies in the rain-shadow of the mountains and so is much drier than Norway. It is also cut off by the mountains from the effects of the warm air currents, and so has a climate of extremes, getting very cold in the winter. A great part of the Scandinavian Peninsula is covered with coniferous forests.

Norway is larger than the British Isles but has only 3,500,000 people. The only lands which can be used for cultivation are delta-lands at the heads of the fiords, the narrow strips along their sides and some of the broader valleys, especially the Glommen Valley and the country around the capital, Oslo. So scarce is land that farmsteads with their tiny fields from which hay is cut are often perched high up on the sides of the fiords and valleys. The wealth of the country comes from the forests and the fisheries. The exports are timber, wood-pulp, and paper; fish and fish-oil and minerals. Norway has no coal, and so has developed its "white coal" resources—that is hydroelectric power from swift streams. The Norwegians, with the sheltered waters of the fiords as a training ground, have always been brave seamen. Many of them have



FIG. E.17.—Scandinavia and Denmark.

Denmark and Norway were invaded by Germany in April, 1940 and not freed until 1945. The port of Hango (Finland), which can be kept free of ice in winter, was leased to Russia as a naval base after the Finno-Russian War of 1939-40.

sailed abroad and settled in new lands, and Norway has still a large merchant navy.

Oslo (formerly called *Christiania*) is the capital and largest town, exporting timber, wood-pulp, etc.

Bergen, on the west, exports timber, and is a centre of fishing industries. Near by is the fishing port of *Stavanger*. *Trondheim*, farther north, is the third port. Railway construction in a mountainous country like Norway is difficult, and there are only railways in the south of the country, except at *Narvik*. The principal lines connect *Oslo* with *Trondheim* and with *Bergen*.

To the north of Norway lie the Arctic Islands of *Spitsbergen* and *Bear Island* and, farther west, *Jan Mayen*. These form the only foreign possessions of Norway, except two tiny islands in the Southern Ocean and part of *Antarctica*. *Spitsbergen* has some coal.

Sweden is larger than Norway, and has more than twice as many people. The southern part of Sweden forms part of the great European Plain. It is covered with glacial deposits, and there are numerous large lakes of glacial origin. The northern parts of the country are forested. So by far the most important exports are timber, wood-pulp, and paper. But southern Sweden is an agricultural country. It suffers from extremes of temperature and is almost too cold for wheat. The leading crops are oats and rye, but large quantities of hay and fodder are grown for feeding cattle. The industries of Sweden have developed gradually as a result of the exploitation of natural resources. There are saw-mill towns all down the shores of the Gulf of *Bothnia*; pig-iron is produced in several districts and electrical machinery is manufactured. An important industry is the making of matches. Sweden was very fortunate in that she was able to remain neutral in both the First and Second World Wars and was not overrun by the Germans. She was able to develop her manufactures and to become rich and prosperous. Although in this large country of 173,000 square miles (nearly twice the size of England, Wales and Scotland) there are less than 7,500,000 people they have a high standard of living.

Stockholm is the capital, and is a fine modern city with many industries. *Göteborg* is the chief port of Sweden. *Malmö* is the train ferry station opposite Denmark. The port of *Narvik* in northern Norway is connected by railway with *Kiruna* and *Gällivara*, where there are some of the largest deposits of high-quality iron ore in the world. The ore is carried across the mountain divide to Narvik as the North Atlantic Drift keeps the ports of Norway ice-free, while those of the enclosed, shallow and almost fresh Baltic freeze.

Norrköping has textile works. The saw-mill towns as well as Stockholm suffer from being ice-bound for many months of the year. The iron-ore regions are inside the Arctic Circle

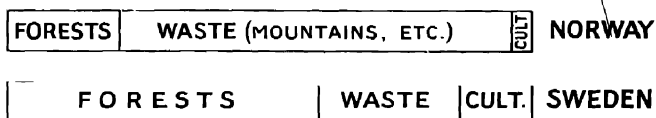


FIG. E.18.—Uses to which land is put in Norway and Sweden.

Notice the very small area of cultivated land in Norway



FIG. E.19.—Exports of Norway and Sweden.

where the sun does not appear in midwinter for many weeks together and so work has to be carried on with the aid of arc lights.

Sweden is fairly well supplied with railways. Because Sweden has no coal all the main lines are electrified, but on the branch lines the engines burn wood. The important Gota canal connects Lakes Vener and Vetter with the Baltic Sea on the one hand and Göteborg (or Gothenburg) on the other.

Study Figs. E.18 and E.19 carefully for the occupations and trade of Norway and Sweden.

In the north of Norway, Sweden and Finland, beyond the forest limit is Lappland, so called because it is inhabited by the Lapps. The Lapps are a race of small people who live in

"camps" or villages in winter but in summer take their herds of reindeer out to the tundra grazing grounds. There are only a few thousand of them.

QUESTIONS AND EXERCISES

1. Compare and contrast Norway and Sweden as regards physical features, climate, population, and occupations.
2. Explain fully why the Norwegians have a large fleet of merchant vessels.
3. Compare and contrast, with sketch-maps, Scandinavia and the southern island of New Zealand.
4. Draw a sketch-map to show the communications of Scandinavia. Indicate ports or routes which are closed in the winter.

FINLAND (SUOMI)

Finland is the third of the countries mentioned on p. 171, as lying on the great ancient earth block of Fennoscandia. The southern part is separated from Sweden by the Gulf of Bothnia, a northern continuation of the Baltic Sea.

Finland, known in the Finnish language as Suomi, is an independent republic, separated from Russia in 1919. From 1809 to 1919 Finland had been a grand duchy under the Russian Empire, but her people are very different from the Russians. The Finns are not unlike the people of Sweden, and are usually tall and well built, often with fair hair and blue eyes. It is very important not to confuse Finns and Lapps. The Finns number about 4 millions, nine-tenths of them speaking Finnish, the remainder speaking Swedish. Finland stretches from the shores of the Gulf of Finland to well within the Arctic Circle but lost her outlet to the Arctic Ocean after her war with Russia in 1939-40. Practically the whole country lies north of the latitude of 60° North—that is, the latitude of the Shetland Islands—and so, with the exception of Iceland, Finland is the northernmost independent country in the world.

Finland differs from Sweden in that the great complex of ancient crystalline rocks has been worn down and smoothed by ice action, so that at the present time there are very few hills more than 500 feet above sea-level, except in the north.

The remainder of the country may be divided as shown in Fig. E.20. The regions shown on that map are as follows:

(a) The central lake-studded plateau. The ice-sheet has removed much of the soil from the higher parts, but has deposited sands and gravels in the hollows, and now most of the fertile land is found there bordering the innumerable lakes.

(b) The southern coastal strip has a hummocky surface partly due to the deposits of sands left by the Ice Age and partly because of the smoothing of the ancient rocks, so that where this surface has been invaded by the waters of the Gulf of Finland there is an archipelago of innumerable islands.

(c) The western coastal strip has few lakes, and there are wide stretches of rather infertile land.

(d) The high country of the north forming the Baltic-Arctic divide is largely occupied by tundra lands stretching towards the Arctic Ocean. Here the Lapps live.

Over the plateau the extraordinary network of lakes and watercourses permits communications by water almost from one end to the other during the summer months, and allows the removal of timber from the forests which would otherwise be very difficult to reach. The waters from the central plateau, although it is only a low plateau, find their way to the coastal strip in a series of rapids. These form a very important source of power in a country which has no coal and very few other minerals.

In its climate Finland is intermediate between Scandinavia and Russia. The summers are warm and the winters cold—below freezing. But it is just possible to keep the port of

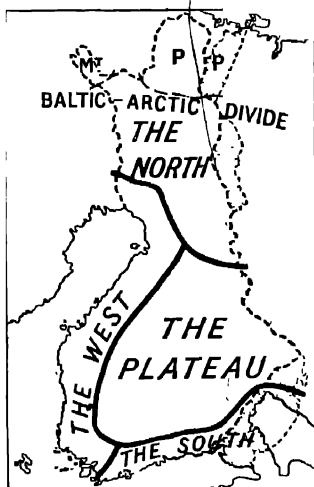


FIG. E.20. --The natural regions of Finland.

Dotted=areas ceded to Russia, 1940.
Mt.=mountainous area. PP=area draining to the Arctic and in the hinterland of the port of Petsamo.

Jango (in the extreme south-west) open throughout the year by breaking up any ice which forms. The port of *Helsingfors* or Helsinki, the capital, is, however, closed by ice in the winter. In the north of Finland, just as in the north of Norway and Sweden, there is the Land of the Midnight Sun, for within the Arctic Circle there must be at least one day of the year on which the sun never sets. In all parts towards the north the summer days are very long, and barley grows more than a hundred miles within the Arctic Circle.

More than three-quarters of the whole surface of Finland is covered with forest. Almost everywhere there are three principal trees, the Scots fir, the Norway spruce, and the silver birch, together with smaller quantities of others. Usually the cutting of the timber goes on through the winter months, and the logs are piled up on the banks of the frozen lakes or watercourses. In May, as soon as the ice has melted, the logs have to be put into the water and either floated down or tied together in rafts and towed down by steamers to the saw mills. Lumber-timber is important, but there is also a large manufacture of wood pulp, quantities of which are sent to Britain. The pine and the spruce are used for this purpose; the birch is used mainly for fuel, as the country has no coal. Some of the birch is also used for making into reels (spools), such as those on which cotton is wound, also into three-ply and five-ply boards, the manufacture of which is another important industry. The manufacture of matches is also carried on. It is not surprising to find that 85 per cent. of all the exports are products from the forests—timber, wood pulp, paper, and articles made of wood. Although farmland only occupies about 6 per cent. of the surface, being found in the depressions filled with glacial soil, grass grows well and is cut and carefully dried in summer so that it can be used as hay for the winter feeding of cattle. Thus cattle-rearing and the production of butter are industries of importance in Finland and there is a very considerable export of butter.

In addition to the wood-working industries, Finland has engineering works and factories for the manufacture of textiles for use at home. The chief town is the capital, *Helsingfors*,

which is the Swedish name, Helsinki being the Finnish name. *Abo* (Turku) is the principal port of the west *Viborg* (Viipuri) in the south-east and *Hango* in the south-west were ceded to Russia after the Finno-Russian war of 1939-40. *Tampere* is a manufacturing town in an inland position. A road runs through from the northernmost point on the railway to the Arctic coast at Petsamo now in Russia.

More than 40 per cent. of the exports of Finland go to Great Britain. Germany, Great Britain, and the United States supply the bulk of her imports. The Finns, even in the very heart of their country, have so many large lakes that they are all good boatmen and sailors. They take naturally to the sea, and Finland possesses a large merchant navy of 5,000 vessels, including a considerable number still of the fine old sailing vessels, which are excellent for carrying cargoes of timber. It will be seen that the Finns are an important and a progressive nation.

POLAND

The old kingdom of Poland was once an important country of Europe, but before the war of 1914-18 was occupied partly by Germany, partly by Russia and partly by the old Empire of Austria-Hungary. It then became independent as a republic until invaded by Germany and Russia in September, 1939, when it was temporarily divided between them. Poland is an example of a state with no natural or geographical boundaries. It consists almost entirely of flat land, and fades eastwards into Russian territory, westwards into Germany. As constituted from 1919 to 1939 Poland included a large tract of country in the east inhabited mainly by Russians. In the post-war settlement this country has been added to Russia but Poland has received a part of the former eastern Prussia in the north and a section which was formerly Germany in the west—including nearly the whole of Silesia with the great Silesian coalfield. Before 1939 the area of Poland was about 150,000 square miles—more than the whole of the British Isles—and the population about 35,000,000. During the war over

6,000,000 Poles were killed. About 5,500,000 of these (including nearly all the Polish Jews who numbered 3,000,000) were civilians murdered by the Germans in concentration camps. In 1946 the area of the new Poland was about



FIG. E21.—Poland.

Notice the position of the Silesian coalfield and Danzig. Land over 500 feet, light dots; over 1,000 feet, dark dots.

120,000 square miles and the population 24,000,000—now 28,000,000. The Germans living in the western territories added to Poland have mostly moved westwards into Germany and Poland is now a republic closely allied to Russia.

Running through the heart of Poland is the great highway, the River Vistula, on which is situated the capital *Warsaw*.

(in Polish *Warszawa*). The natural outlet of Poland is the port of *Danzig*, but this city was mainly inhabited by Germans and so, from 1919 to 1939 was made a "free city" under the control of the League of Nations. As a result Poland built her own port at *Gdynia*.

Regions. Poland can be divided into a number of regions.

The Baltic Lake Country is a rolling plain, largely of poor sandy soil with low ridges which are the moraines left by the melting of the great ice-sheets of the Ice Age. In the hollows are lakes. The Baltic coast is a shallow sandy coast fringed by lagoons or *haffs* so that there are few ports or towns along the coast. *Danzig* (Polish: *Gdansk*) and *Gdynia* are the outlets of the Vistula basin. The old German port of *Stettin* which the Poles have named *Szczecin* is now in Polish territory and is the outlet of the rich Oder basin.

The Great Polish Plain is essentially an agricultural country, though large areas of the poorer soils are forested. The once extensive marshes have been drained. The climate is a little too severe for wheat so that the chief crops are rye, oats, barley, and potatoes. Large quantities of sugar beet are grown and also flax and there are huge numbers of cows and pigs. The plain stretches from the Oder in the west, and the centre of the western half is *Poznan* as *Warsaw* is of the eastern. Near the southern margin is *Lodz* (cotton manufactures) and there are sugar factories and saw-mills in various parts of the plain. *Warsaw* suffered terribly from the war—it had important iron, steel, leather and textile industries.

Silesia (Upper and Lower) is the upper part of the Oder basin and was formerly mainly in Germany. The great centre of the rich agricultural lands of Lower Silesia was *Breslau* (now renamed *Wroclaw* by the Poles). The very rich Silesian coalfield in Upper Silesia is now entirely in Poland except for the small part around *Teschen* in Czechoslovakia. There are great iron and steel and other metal works and many towns of which *Katowice*, *Gleiwitz* (now called *Gliwice*) and *Beuthen* (*Bytom*) are the chief.

The Plateau of Southern Poland is a low plateau, with some ridges of old rock but covered for the most part with a fertile

soil derived from loess which hides the solid rocks below. *Lublin* is a manufacturing town in this area.

The Sub-Carpathian trough is a valley which separates the plateau from the Carpathian foothills and forms an important corridor from east to west. This country was formerly known as Galicia and the fine old city of *Krakow* is its centre—nearby are famous salt mines.

The Carpathians are largely forested and much timber is produced. There are holiday resorts in the mountains but the former Polish oilfields now lie in Russian territory as does the old city of *Lwow*.

Trade of Poland. Poland exports particularly the products of her forests (timber, wood pulp and paper), the products of her mines (coal), as well as agricultural produce, including bacon, pigs, eggs, and sugar, also some cereals, and an increasing proportion of manufactured goods, especially cotton goods. There was formerly an important trade with Great Britain by sea through Danzig and Gdynia, although much of the trade of Poland was with her neighbour Germany. Poland imported large quantities of raw materials for her manufactures—raw cotton and raw wool particularly—as well as foodstuffs, notably wheat flour and wheat, since wheat does not grow well in the country, together with coffee, tea, and other foodstuffs from warmer climates. Then there was a large import of manufactures, such as machinery, chemicals, leather, and others. Now the trade is mainly with the countries behind the Iron Curtain, especially the U.S.S.R.

GERMANY

The northern part of central Europe has long been inhabited by people whose language is German. For centuries they were organised in small kingdoms and states of which the largest was Prussia. The Prussians occupied most of the northern plain and, in the Middle Ages, some of them settled to the east of the River Vistula around the port of Königsberg so that they were cut off from the main part of Prussia by a strip of Polish territory. In 1864 Prussia attacked Denmark, in 1866 fought Austria and in 1870 defeated France and took from her the rich province of Alsace-Lorraine. In 1871 the

various German-speaking countries (except Austria) joined together as the German Empire and the King of Prussia became Emperor of Germany. The Germans then began to acquire colonies and in 1914 ruled over a million square miles in Africa and many Pacific islands. In that year Germany invaded Belgium, Britain went to the aid of Belgium and the First World War followed. The war came to an end with the Armistice of November 11th, 1918, and Germany became a republic. All her colonies were placed under the League of Nations and given to Britain, France, Belgium and other countries to rule under mandate from the League. Alsace-Lorraine was restored to France. But Germany secretly rearmed under the orders of Adolf Hitler and began to attack other countries. Austria was annexed in 1938 and a large part of Czechoslovakia later the same year. In 1939 Germany invaded Poland; Britain went to the aid of Poland and the Second World War started. At first the Germans, allied with Italy, were successful, and occupied most of Europe—invading Russia in 1941 and getting as far as Leningrad, Moscow and Stalingrad, but failing to occupy them. Germany was defeated by British-American forces in 1945 and Germany was divided into four Zones of occupation. Berlin was also divided into four zones. A large part of eastern Germany was attached to Poland and the formerly separated part of Eastern Prussia became partly Polish, partly Russian.

In 1948 the three western zones became the Federal Republic of Western Germany (capital, Bonn) and the next year the Russian zone became the German Democratic Republic with a communist type of government. Western Germany has an area of about 95,000 square miles with 51,000,000 people (1956). Occupation troops were withdrawn in 1955. Eastern Germany of about 43,000 square miles has 16,500,000 people, not including 3,400,000 in Berlin.

In the latter part of the War many German towns, especially in the industrial areas, were almost completely destroyed by bombing but have now been largely rebuilt.

Physical Features. Germany falls into two main divisions:

(a) The North German Plain, part of the great European Plain, covered by a thick mantle of glacial clays and sands.

(b) The Central Highlands and Alpine Foreland, a varied mass of hills and low mountains occupying the southern half of the country and extending almost to the Alps.

Germany can also be divided into its great river basins.

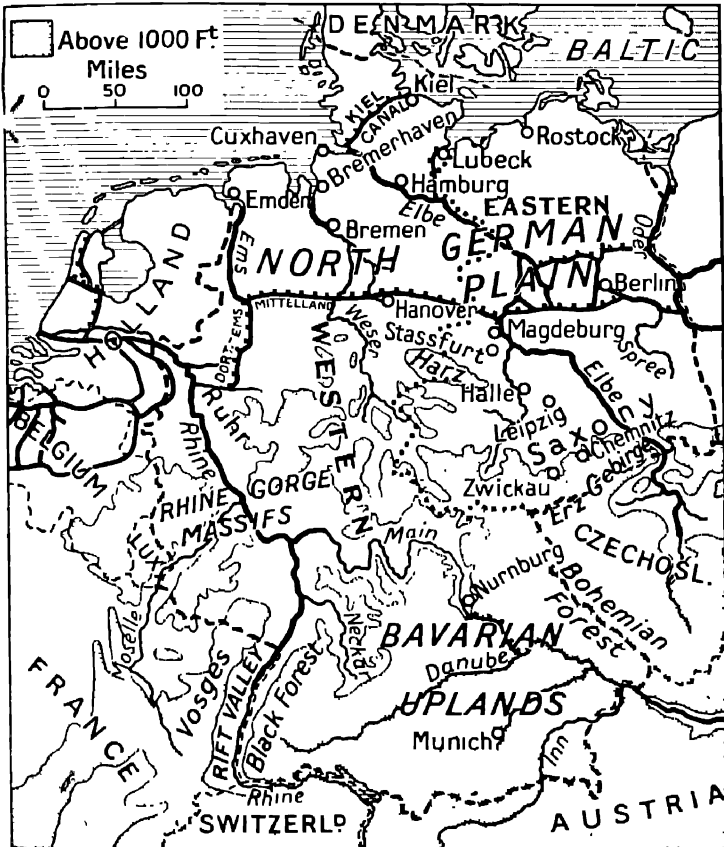


FIG. E.22.—The rivers and regions of Germany

Notice carefully which regions and towns are in Western Germany and which in Eastern.

The four chief rivers all flow north-westwards: the Oder (now mainly in Poland) to the enclosed Baltic Sea; the Elbe, the Weser, and the Rhine to the North Sea. These rivers form valuable highways. The Elbe rises in Czechoslovakia and

passes from that country into Germany through a deep but navigable gorge, and then through the heart of the North German Plain to the North Sea, where is to be found the greatest of all the German ports—Hamburg. The Weser is entirely a German river. The Rhine rises in Switzerland and then forms the boundary between Germany and France where it passes through its rift valley. It then has a long course through German territory and is joined by important tributaries (including the Ruhr) before passing into Holland and finding its way there to the North Sea. Part of the uplands of the south of Germany lie in the basin of the River Danube. Notice the important canals which have been constructed to link up the navigable waterways of Germany. The great Mittel-land Canal opened in 1938 provides a continuous canal system from east to west through the North German Plain, and much more use is made of water transport in Germany than in Britain. The River Rhine is sufficiently deep for ocean-going steamers to pass right through Holland and reach the great Ruhr industrial region in the heart of Germany itself.

The Minerals of Germany. Mining industries employ about 800,000 persons. Before the Second World War the value of the mineral production was nearly as great as that of the United Kingdom, the principal minerals being coal, brown coal or lignite, iron ore, zinc, lead and copper ores, rock salt and potash salts. Naturally there are few minerals found in the young rocks of the North German Plain. Most of the mineral production is from the other parts of the country. The output of *coal* in Germany was about two-thirds that of Britain or rather more.¹ More than 90 per cent. came from the great coalfields of the Ruhr and Silesia, most of the rest from Saxony. The Silesian coalfield, which is probably the richest in the whole of Europe, now lies entirely in Poland. Lignite, or brown coal, is much more important in Germany than it is in most countries of the world, and production in East and West is now over 300,000,000 tons. But it is necessary to burn much more brown coal than ordinary coal to get the same amount of heat, so we may say that 9 tons of lignite are

¹ Production of coal in western Germany has recovered to over 135,000,000 tons and of brown coal to over 90,000,000 tons.

equivalent to about 2 tons of ordinary coal. The brown coal deposits are much younger than those of ordinary coal. The beds are very thick and occur near the surface, so that they are often worked in large open quarries. Germany has home supplies of *iron ore* in the valley of the Sieg, a tributary of the Rhine, and these ores are smelted in the Ruhr. But Germany, like Britain, had to import iron ore, particularly from Sweden and Spain, for her great iron and steel industry. Germany has been very fortunate in her possession of thick beds of *potash salts*, not very common in other parts of the world. The most famous deposits are those of Stassfurt in Saxony, and it was partly because of these deposits that Germany developed a great chemical industry.

Climate. The climate of Germany is intermediate in character between the oceanic climate of north-western Europe and the continental climate of Poland and Russia. Most of the country lies in the region which is said to have a "central European" type of climate.

As one goes from west to east the winters become colder, the summers slightly warmer, just as we should expect from the climatic maps (Figs. E7, E8). In southern Germany many of the valleys are sheltered and have mild winters, so that in the Rhine gorge and rift valley, for example, the cultivation of the vine is important.

Vegetation. The higher hills and mountains are clothed with valuable coniferous forests, and forestry in Germany is an industry of great importance, conducted under the care of the State on scientific lines. Those parts of the North

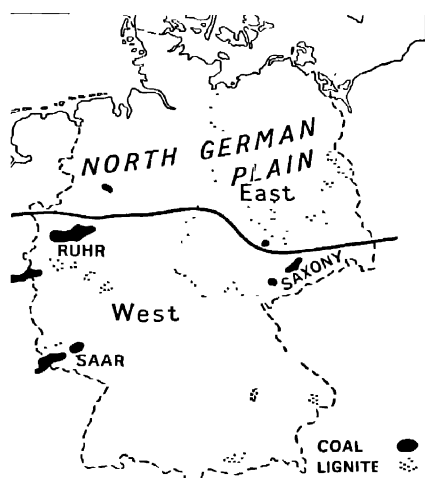


FIG. E.23.—The twofold division and the coalfields of Germany.

European Plain which are not rich enough to be used for agriculture are carefully afforested, and so Germany is able to produce the greater part of her requirements of timber.

Farming. Although much of the soil of Northern Germany is poor, the land is carefully farmed. Where cereal crops cannot be grown hay is important and covers nearly one-third of all the cultivated land in Germany. The chief grain crop is rye, for wheat will not grow well on the poor soil, and most of the poorer people of Germany eat rye bread. In other countries rye bread is sometimes called "black bread," but it is very wholesome, and people who are used to eating it often do not like wheaten bread. Potatoes are very widely grown on the poorer soils of Germany and they are used as a source of alcohol required in industry. It is for this reason that they cover many times as much land in Germany as they do in Britain. Sugar-beet is a crop of great importance, especially in central Germany, and Germany is the largest producer of beet-sugar in the world. Germany has normally more than twice as many cattle as Britain, and so has a large home production of meat, milk, and other dairy produce. Sheep are not important, but there are large numbers of pigs.

Manufactures. It is because Germany is mainly a manufacturing country that Western Germany and Britain have again become great rivals in most of the markets of the world. Over 12,000,000 people are actually workers in the factories of Western Germany, and four-fifths of all the exports of the country are manufactured goods. There is a huge production of iron and steel, especially in the Ruhr, and Germany has large engineering and shipbuilding industries. The manufacture of cotton and woollen goods, other textiles, and clothing give occupation to more than 4,000,000 people, but the industries are not nearly so concentrated as they are in Britain. Other leading industries are the manufacture of chemicals and electrical apparatus, as well as sugar-refining, brewing and other industries connected with agriculture.

We will now consider the more important regions of Germany.

The North German Plain is essentially an agricultural region. In many places the soil is dry and sandy, but has been carefully

farmed; in other places marshes and bogs have been drained, so that now more than half the plain is ploughed, a quarter used for cattle grazing, and most of the remainder is woodland or forest. The most important grain is rye; next comes oats but wheat will only grow in a few places where the soil is richer. Large areas are used for potatoes and sugar-beet.

Half the plain is in Western Germany, half in Eastern. *Berlin*, the old capital of all Germany and now of Eastern Germany, is only 50 miles from the Polish frontier. On the Baltic Sea are the ports of *Lübeck* and *Kiel*, the latter at the Baltic end of the Kiel Canal. The Baltic Sea ports suffer by being blocked by ice in the winter. Also the Baltic coast of Germany is a shallow shelving coast, and the large lagoons called "haffs" by which the coast is fringed are usually too shallow to be used by large vessels. So it is the short North Sea coast of Germany which is of the greatest importance to the country. Notice the position of *Hamburg*, the largest port, and of *Bremen*, also a leading port, which is the outlet of the Weser basin, just as Hamburg is the outlet of the Elbe basin. Near the mouth of a smaller river, the Ems, is *Emden*, connected by the famous Ems-Dortmund canal with the Ruhr. Besides Berlin, other important inland centres are *Hanover* and *Magdeburg*, both near the southern margin.

The Rhineland. The River Rhine rises amongst the higher Alps in Switzerland and, after flowing through Lake Constance, for some distance forms the boundary between Germany and Switzerland. In this part of its course, but in Swiss territory, are the famous Falls of Schaffhausen which have been used for the generation of power. The Rhine leaves Switzerland just below Basel (Bâle), and from this point is navigable by barges. It then flows through its famous rift valley with a wide and fertile plain on either side. The river itself here forms the boundary between Germany and France. The Vosges Mountains bound the Rhine rift valley on the French side, the Black Forest or Schwarzwald on the German side. Farther north the whole of the rift valley is in Germany. At Mainz the river is joined by one of its chief tributaries, the Main, and it there changes its course towards the west and commences the passage through the famous Rhine gorge.

Where it emerges from the gorge at Bonn it is joined by a small tributary, the Sieg, and passes by Cologne and Düsseldorf before being joined by the Ruhr. Below the junction with the Ruhr

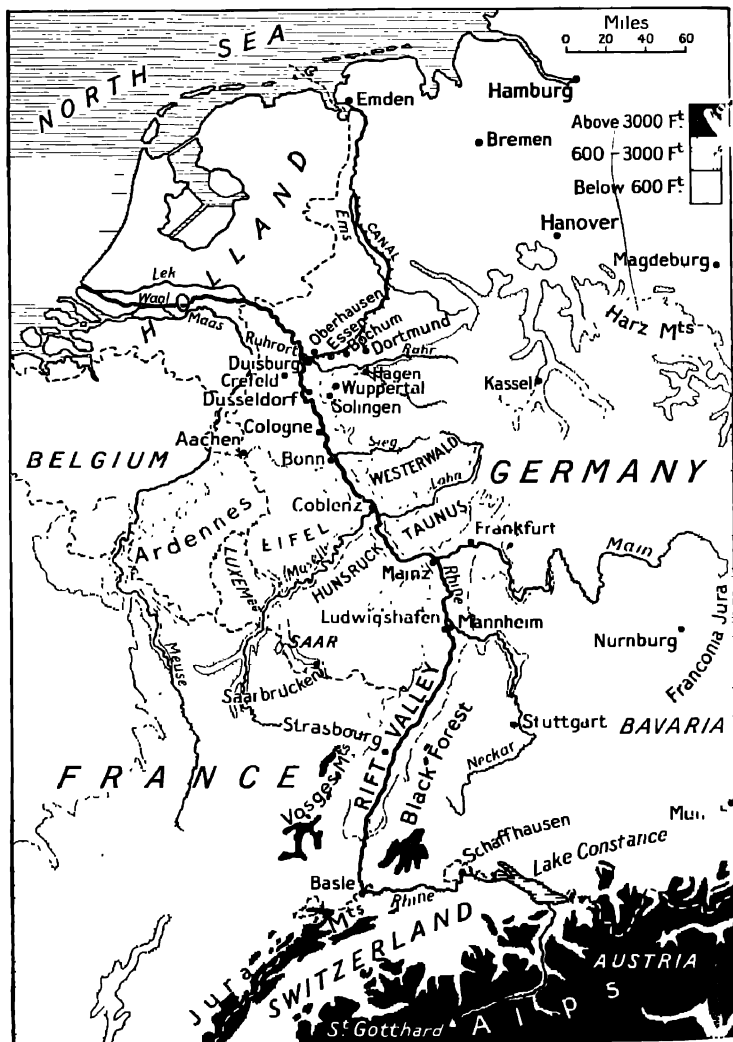


FIG. E.24.—The Rhine Basin.

The Swiss town formerly called Basle in England is known to German-speaking SWISS as Basel and to French-speaking as Bâle.

there is a short course through the North German Plain before the Rhine passes through Dutch territory and finds its way to the North Sea. Thus a very large part of the course of the Rhine is through Germany, and the Rhineland comprises the greater part of the West German Federal Republic.

(a) *The Rift Valley.* This is a broad fertile valley forming a rich agricultural region growing barley, wheat, tobacco, the vine, and fruit. The valley is sheltered and so enjoys milder winters than the uplands on either side. Notice where the Rhine is joined by the rivers Neckar and Main, for the lower parts of these valleys form extensions of the fertile agricultural belt of the Rhine itself. *Ludwigshafen-Mannheim* is an important distributing centre at the junction of the Neckar and the Rhine, whilst industrial centres have grown up at *Frankfurt-on-Main* (machinery, chemicals, and brewing) and at *Mainz* (leather and machinery).

(b) *The Rhine Gorge Massifs.* Between Mainz and Bonn the Rhine flows through its famous gorge, with two mountainous blocks of old rocks flanking it on each side. On the west are the Hunsrück and the Eifel—separated by the valley of the Moselle; on the east are the Taunus and Westerwald. The mountains are largely forested, but in the sheltered Moselle Valley, as well as in the Rhine Valley itself, the vine flourishes and one may see the vineyards clothing the steep slopes on either side of the river. Notice from the atlas how the Rhine gorge is utilised by railways, and remember also that the river is navigable by large river steamers. The most important town in this stretch is *Coblenz*, where the Moselle joins the Rhine.

(c) *The Industrial Region of the Rhine and the Ruhr.* This is the greatest of all the industrial regions of Germany. Part of it lies along the banks of the Rhine from *Cologne* northwards, through *Dusseldorf*, a great iron and steel and general manufacturing centre, to *Duisburg* and *Ruhrort*, where the Ruhr joins the Rhine. Iron and steel is the basic industry on the great Ruhr coalfield and is carried on especially at *Essen*, also between *Wuppertal* and *Hagen*, at *Dortmund*, *Dusseldorf*, and *Duisburg*. *Solingen* is famous for cutlery steels and might

be called the "Sheffield" of Germany. The textile industries are important at *Wuppertal*—a town formed by the union of *Barmen* and *Elberfeld* (cottons and woollens), at *Crefeld* (particularly silks) and at *Aachen*, which forms a distinct and separate industrial region near the Belgian frontier. Ocean steamers come as far as *Duisburg*, which carries on ship-building. Other large towns in the Ruhr are *Oberhausen* and *Bochum*. The famous bridge town of *Cologne* (Köln) has a great variety of manufactures, including textiles, machinery, sugar, cocoa, and chocolate. Nearby are large quarries of brown coal.

Saarland (which the French call the Sarre) is on the borders of France and has long been a subject of dispute between Germany and France. After the Second World War it became autonomous but later voted to be reunited with Germany. The language is German and there are nearly a million people. It is a coalfield with important iron and steel industries, using iron ore from Lorraine. *Saarbrücken* is the chief town.

The Bavarian Uplands. The south of Germany, east of the Rhine rift valley, is occupied by a great stretch of uplands, nearly all over 1,000 feet above sea-level, lying between the Black Forest on the west and the Bohemian Forest which forms the boundary with Czechoslovakia on the east, and extending from the Alpine foreland on the south to the Thuringian Forest, the Harz and other mountains of Central Germany. A large part of this great plateau forms Bavaria, which was a separate state within the republic of Germany. A large part of the region lies in the basin of the Upper Danube, but the west and north-west are drained by tributaries of the Rhine. The hillier parts of the whole area are generally covered with valuable coniferous forest; the higher hills often have pastures where dairy cattle are kept. The less rugged parts have good soils and enjoy a better rainfall than is found in northern Germany, and grow large quantities of barley, oats, wheat, and other crops. The sheltered valleys are the most important and the richest regions. *Munich* (München) is celebrated for its beer, and both *Munich* and *Nürnberg* are examples of towns not well situated in relation to coal, raw materials, or communications, but which have developed important industries in the manufacture of small articles requiring only little raw

material. These include pencils and toys—originally made from the wood of the local forests, but which are now mainly made of metal—electrical apparatus and scientific instruments. *Stuttgart* is the main centre in the Neckar Valley. A ridge of hills—the Franconian Jura—runs across the plateau and separates the basin of the Danube from that of the Rhine.

The Harz Mountains and the Surrounding Region. The mountains are forested, but the low hills by which they are surrounded form a rich agricultural area known for its sugar-beet, wheat, and fruit, since the soils are better than in the great German Plain to the north. To the south-west of the Harz is the large town of *Kassel*.

The Saxony Industrial Region. Saxony also lies on the southern side of the great North German Plain and has better soils, so that it grows large quantities of sugar-beet, wheat, barley, rye, oats, and potatoes. It also has coal basins, as well as large quantities of lignite, and so manufactures have been developed. On the south lie the Ore Mountains, or Erz Gebirge, on the border of Czechoslovakia. Despite their name, the production of minerals is now very small. It was the sheep living on these mountains which formerly furnished the supplies of wool—of very fine quality—for textile manufacture; but wool has been largely replaced by cotton. *Chemnitz* has become the “Manchester” of Germany and *Zwickau* is another centre. *Dresden* has given its name to a famous type of china, now largely manufactured at Meissen; and on the borders of Saxony and the North German Plain is *Leipzig*, long famous for its fair and well known as a printing and publishing centre. A few miles to the north-west is the large town of *Halle*. All this region lies in East Germany.

The Trade of Germany. *Hamburg* is by far the most important port of Germany and one of the largest on the whole of the continent of Europe. All of the North Sea coast is shallow and some of the river mouths suffer from sandbanks, but both Hamburg and Bremen are kept free from sand at great expense. Although many large vessels use the “outports,” or newer ports at the mouths of the rivers, it has been made possible by constant dredging for them to reach the main ports. Cuxhaven

is the outport of Hamburg and Bremerhaven the outport of Bremen. We should compare Tilbury in the case of London. The Baltic Sea ports, including Königsberg formerly in East Prussia (now called Kaliningrad and in Russia), Rostock, and Lübeck, have been brought into easy communication with the

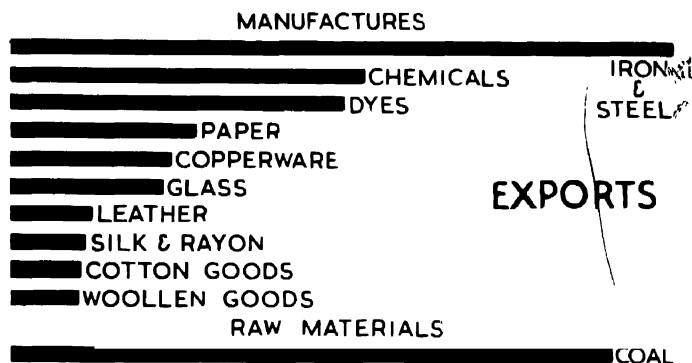


FIG. E.25.—The exports of Germany in the years between the wars—mainly manufactured goods. The recent trade of Western Germany is similar.

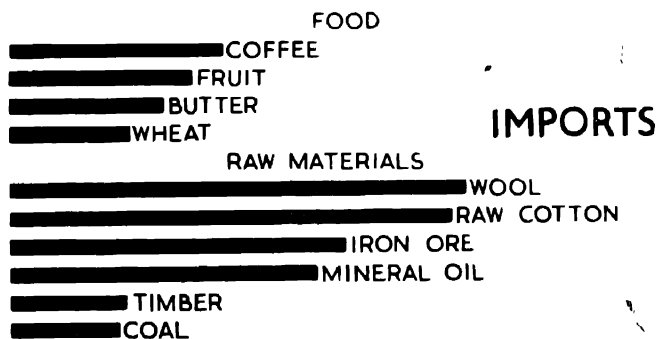


FIG. E.26.—The imports of Germany in the years between the wars—mainly food and raw materials. The recent trade of Western Germany is similar.

North Sea through the famous Kiel Canal. Study carefully the diagrams showing the exports and imports of Germany, because they show why Germany and Britain were such great rivals in the years before the Second World War and why Western Germany has again become a serious competitor.

Both countries have to import large quantities of food, as well as raw materials for their manufacturing industries. These imports have to be paid for by the export and sale of manufactures. And so Germany had to seek markets for her manufactures in all parts of the world, and we find that German foreign trade was very widely distributed. This is again the case with Western Germany and her most important customers are the United States, the Netherlands and her other neighbours in Europe and Britain, whilst she purchases large quantities of her requirements from her neighbours and the United States, as well as from Britain.

Germany is well served by an excellent system of railways, and has been foremost in developing special express motor-roads (*autobahnen*).

DENMARK

Denmark is a very small country, considerably smaller than Scotland. It consists of the low peninsula of Jutland and a group of islands in the Baltic Sea. The whole land is very flat, and there is no hill more than a few hundred feet high. Much of the western coast of the peninsula is waste land; it is covered by sand dunes thrown up by the sea. Forests have been planted to prevent the sand from blowing inland. The rest of the land is very carefully cultivated, and although the country is so small, there are more than 4,500,000 people, and the crops produced are of very good quality. There are nearly as many cows in Denmark as there are people, and many more pigs, as well as 20,000,000 hens. So the principal products are butter, cheese, bacon, and eggs. Although the country is so small and has few minerals, no coal, no water-power, and only a poor soil, it is rich and prosperous because of the care with which the people work the land. There are many factories, but they are nearly all connected with agricultural products—there are factories for making butter and cheese, sugar from sugar-beet, beer and lager from barley, and margarine. There are good fishing grounds on the shallow west coast, and young fish are hatched in the “Lim Fiord.” The fishing centre and west coast port is *Esbjerg*. The principal town and port is *Copenhagen*, with

a million people. Notice the position of Copenhagen and how Denmark controls the narrow entrances to the Baltic Sea. The channel most used is that called The Sound, marked 1 on Fig. E.27. It lies between the island of Zealand and the coast of Sweden. Although only a few miles wide, it is deep enough for

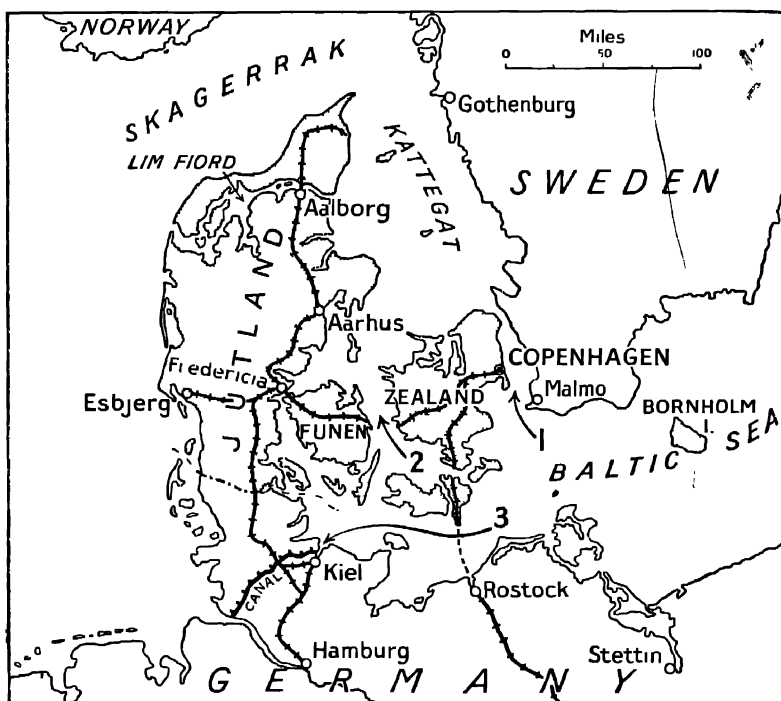


FIG. E.27.—Denmark and the Kiel Canal.

The routes marked 1, 2, and 3 show the chief approaches to the North Sea from the Baltic. The small island of Bornholm yields clay for china-making. Notice the railways, there is now a bridge from Jutland to Funen but train ferries play an important part in taking the trains from island to island. It is possible to take a night train from Berlin and wake up in Copenhagen without having had to change.

large steamers. Because Denmark is only separated from Sweden by this narrow strait, it is possible to send electric power by cables from one country to the other. Because Denmark has no coal, she buys hydro-electric power from Sweden, where it is made through the agency of the swift streams.

Greenland, which belongs to Denmark, is a very high plateau, almost entirely covered by a great sheet of ice and so practically useless. There are a few thousand people on the ice-free eastern and western margins; most of these are Eskimos who make their living by catching seals and fish.

Iceland is a mountainous island more than twice the size of Denmark, largely covered with snow and ice. The west and south-west coast is a little warmer and the people rear cattle, sheep, and ponies. The only town is *Reykjavik*.

When Germany invaded and seized Denmark in the spring of 1940, the Iceland parliament took over all powers of government and a protective force of British troops landed on the island. Britain at the same time took over the guardianship of the Faeroe Islands, which occupy an important position at the entrance to the North Sea. In 1944 the people of Iceland (130,000) decided to become a separate republic having previously been a kingdom under the same king as Denmark. The Faeroe Islands ("Sheep Islands") belong to Denmark, but since 1948 have enjoyed a considerable measure of home rule.

THE NETHERLANDS OR HOLLAND¹

Holland, or the Kingdom of the Netherlands (Koninkrijk der Nederlanden), is a small country only 13,500 square miles in area. It is thus only about half the size of Scotland. The Netherlands are, however, thickly populated. There are over 11,000,000 people or nearly 800 to the square mile. On the morning of May 10th, 1940, Holland and Belgium were invaded without warning by Germany and were occupied till liberated in 1945.

Holland consists almost entirely of the delta of the Rhine and Meuse, with the low coastlands to the north. The whole country is very flat; only in the extreme south-eastern corner is there any land over 300 feet above sea-level. Large tracts, shown roughly by the black areas on Fig. E.29, actually lie below the level of the sea, and have been regained from the sea by centuries of labour. They are separated from the

¹ For certain purposes (e.g. Customs) Belgium, the Netherlands and Luxembourg have joined together as the BENELUX union.

North Sea by lines of sand dunes. These tracts must, of course, be artificially drained; and in addition there are large areas which, though above sea-level, yet lie so low that they cannot be drained by ordinary means. Hence "polders"—that is,

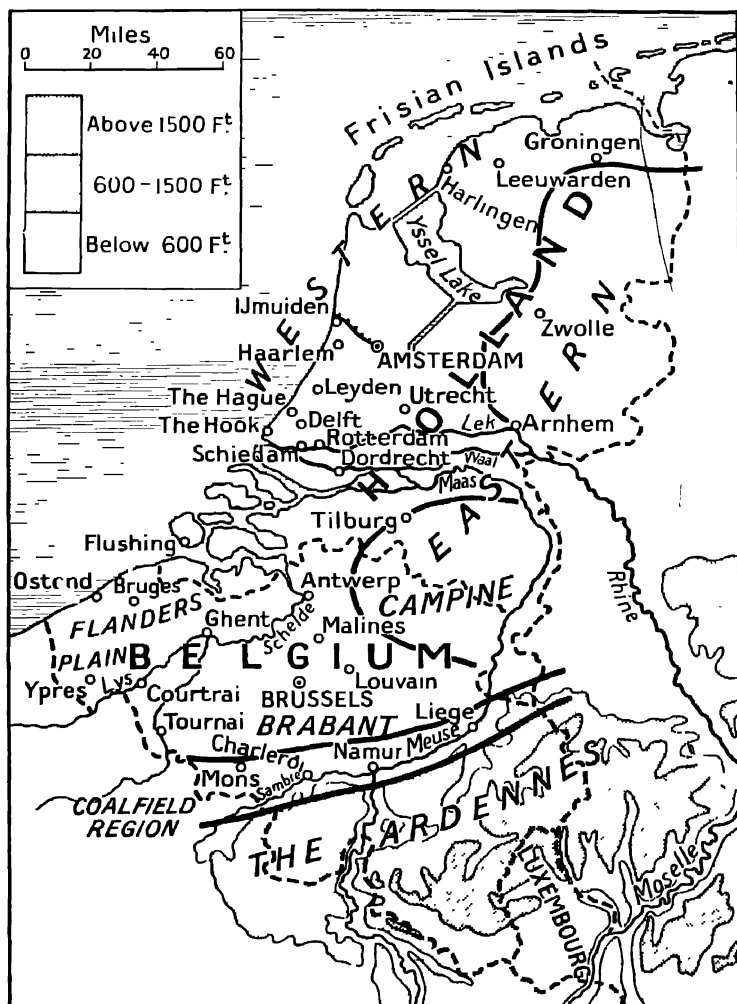


FIG. E.28.—Holland and Belgium.

This map shows as land some of the area of the old Zuyder Zee not yet reclaimed (see Fig. E.29). More land is to be reclaimed at the mouths of the Rhine.

enclosures surrounded by dykes or embankments and provided with pumping-machinery—form the characteristic scenery of the most productive parts of the country. The soil of such areas is naturally moist and well fitted for the finest pasture grasses on which horses and cattle thrive. In the east of the country there are large tracts of sandy heathland or peaty marshes, of little use for agriculture. As a result the fertile parts of Holland are very crowded indeed. Land is very precious, so the Dutch have built a great dyke across the entrance to the old Zuyder Zee and have made it into a great lake called Yssel Lake which they are gradually enclosing, section by section, and so are adding new “polders” for the use of the farmers.

We have already learnt something of the climate of south-eastern England. Holland is farther east and so, as we can see from the climate maps of Europe, is colder than England in the winter. Most of the canals and lakes become frozen over for a short time. In summer it is a little warmer than it is in eastern England.

Twenty per cent. of the people of Holland are engaged in agriculture. They grow rye, oats, wheat, barley, and potatoes for their own use; another important crop is sugar-beet from which sugar is made both for home use and export. An interesting industry is flower-farming; large quantities of flower bulbs such as tulips and narcissi are grown and exported. Very important indeed is dairy farming. The cattle,

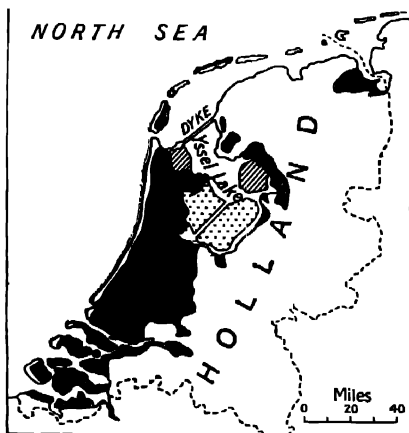


FIG. E.29.—The reclamation of the Zuider Zee.

Existing land below sea-level shown in black; dotted areas are the tracts to be reclaimed. The lined area in the west was reclaimed before 1939 and flooded during the war. The north-eastern area (also lined) was reclaimed during the war.

fed on the rich pastures of the polders, produce large quantities of excellent milk, from which butter and cheese are made. Holland has over 2,000,000 cattle and 2,000,000 pigs.

Fishing is important, especially among the islands of the north, and Holland shares in the great herring fisheries of the North Sea. Large quantities of oysters are also produced.

Holland has a coalfield in the south-east (the Campine or Limburg coalfield on the borders of Belgium). The output now averages 12,000,000 tons a year. In 1912 it was only 1,700,000 tons, in 1923 rose to 5,300,000 tons, and in 1936 to 12,800,000 tons. Formerly most of the drainage pumps, flour-mills, and factories were worked by windmills. The windmills were turned round by the winds which, owing to the flatness of the land, blow much more steadily across the country than they do in the more hilly land of England. Now only a few windmills remain. Important oilfields have been discovered recently—now yielding a million tons of oil a year.

In the Middle Ages Holland had a high reputation as a manufacturing country. In the last century the absence of coal was a great hindrance to the development of manufacturing industries, and large quantities of coal were imported from Germany and Great Britain. In the years between the wars industrial development was considerable, and about 40 per cent of the people of Holland are engaged in manufacturing industries of one kind or another. The cotton industry is carried on at Enschede, Almelo, Hengelo, etc., in the province of Overijssel. It was established here, on poor agricultural land and in a thinly populated part of the country, at the end of the 18th century. The large market for cotton goods in the former Dutch East Indies (now the Indonesian Republic) has been a great advantage to the industry.

Linen and other manufactures are carried on at *Tilburg* and *Utrecht*. *Delft* has long been famous for manufactures of china and earthenware. The Rhine, the greatest river of Germany, reaches the sea through Holland, and so it is not surprising that, although Holland has little coal and less iron, shipbuilding and ship repairing are important occupations at the mouths of the Rhine and Meuse. *Amsterdam*, the capital,

is the centre of the diamond cutting industry. The two largest towns in Holland, Amsterdam and *Rotterdam*, are both ports. *Groningen* is the centre of the north-east of the country, and of a great butter-producing area. The royal residence is at *The Hague* ('s-Gravenhage). The four university towns of Holland are Leyden (founded 1575), Utrecht (1636), Groningen (1614), and Amsterdam (1632). The country has long been famous for its art and learning. An industry widely distributed through Holland is the brewing of beer and the distilling of spirit (especially Hollands Gin, which is distilled from rye at Rotterdam and other centres). An important centre of trade is *Arnhem*. *Haarlem* is the hub of the bulb-farming industry.

In foreign commerce Holland has stood in the front rank of nations from the very beginning of its separate existence. Among the facilities for foreign commerce the waterways, natural and artificial, have greater importance in Holland than in any other European country. The length of river and canal navigation is roughly double that of railways; canals are more important than roads. The Dutch are bold and intrepid sailors as their early voyages of discovery proved long ago. Although such a small country Holland has a very large merchant fleet—over 3,700,000 tons. The Dutch are also great airmen and operate the world famous KLM air services.

In recent years the imports were valued at about a quarter of the imports into Britain, and the exports at over four-fifths the imports. In addition there is normally a very large transit trade, for Holland forms the natural gateway to the whole of the Rhine Valley and the most important tracts of Germany.

A new port, Europoort ("Gateway to Europe"), is being built near the Hook.

The leading imports are textiles, cereals and flour, iron and steel, coal, wood, and oil seeds, followed by raw materials of various kinds. The exports are textiles, sugar, cheese, butter, margarine, and paper. The greater part of the trade is normally with the neighbouring countries of Germany, Belgium, France, and Great Britain, but there is a large trade also with Indonesia and the United States. During the German occupation of 1940-1945, many cities were badly damaged by air-raids and much

of the land below sea-level was flooded and years of hard work were needed to restore it to fertility.

The leading seaports of Holland are Amsterdam and Rotterdam. They have many of the same natural advantages as their Belgian rival, Antwerp, and immense sums of money have been spent to make them suitable for modern traffic. *Amsterdam* is connected with the North Sea, near the harbour of IJmuiden, by a deep ship canal (the North Sea Canal). *Rotterdam*, although well situated on the combined mouth of the Rhine and Maas (Meuse), is liable to be obstructed by the sediment brought down by these rivers. A great canal, the New Waterway, connects Rotterdam directly with the North Sea, and ocean-going vessels reach the town at all states of the tide. The port, too, benefited greatly by improvements in the navigation of the Rhine, since it is the natural key to the Rhine Valley.

There are other ports now along the New Waterway and the minor ports of Holland include the Hook of Holland and Flushing (both for passenger and mail traffic with England), Schiedam, Harlingen, Dordrecht, and Delfzijl. Amsterdam has become a great international airport.

QUESTIONS AND EXERCISES

1. Explain carefully why the climate of Holland is like that of eastern England, but why the winters are colder and the summers a little warmer.

2. Draw a sketch-map to show the principal routes from London to Berlin. Which of them pass through Holland?

3. Compare Holland and Denmark.

4. The Dutch are sturdy, persevering, and hard-working. How is this shown in the development of their country?

BELGIUM

Belgium, although a very small country, smaller than either Holland or Denmark, can be divided into three distinct regions:

(a) In the south the Ardennes form a plateau of hard rocks, partly covered with valuable pine forests and partly with sheep pastures. It is thinly peopled, but in the lower, southern hills there is a part of the rich field of iron ore which extends into Luxembourg and France.

(b) In the north is a country of low hills, devoted to agriculture. Near the coast the land is flat. Important crops are rye, oats, wheat, potatoes, sugar-beet, and, in the low-



FIG. E.30.—Belgium, the “buffer state.”

Note the position of Belgium, with no natural boundaries, between the large and powerful countries of France and Germany, hence, a “buffer” state, from the analogy with buffers on a railway carriage. Notice also the position of Holland, covering the mouth of the Rhine and so controlling the main outlet (by water) of western Germany Switzerland, and much of Belgium.

lying tracts, flax. In the north-east (Limburg) is dry sandy country of little use for farming, but here the coal of the Campine coalfield is worked.

(c) Between the agricultural country of the north and the

Ardennes in the south there is a long, narrow strip running right across the country from west to east, and occupied by a coalfield. This is the great manufacturing region of Belgium. Iron ores are brought from the south (Luxembourg), and there are many iron and steel works; zinc ore is obtained in the east, and is smelted near Liège. The chief coal towns are *Mons*, *Charleroi*, *Namur*, and *Liège*. There are glass works and chemical factories at Charleroi, and railway works at Liège. This region is thickly peopled.

Belgium is, in the main, an industrial country and normally exports iron and steel bars, glass and glassware, cotton goods, flax and yarn, and zinc, as well as billets of wood (for pit-props) from the Ardennes.

The capital and largest city is *Brussels*, situated in a central position and well served by railways. *Antwerp* is the largest port, but it can only be reached from the sea through Dutch waters. Like Rotterdam, Antwerp has a large transit trade in goods passing into Germany. *Ghent*, *Tournai*, and *Courtrai* are centres of the flax industry and rose to importance because the waters of the Lys and other rivers are especially suitable for "retting" the flax. The coast of Belgium is continually being added to by the sea. Sand dunes are thrown up by the sea, and the marshland behind can be drained. *Ypres*, *Bruges*, and *Ghent* used to be ports; now they are far inland. It follows that the existing ports, of which the largest is *Ostend*, suffer much from being steadily silted up. Many Belgian towns were destroyed during the First World War, but, by the energy of the people the country quickly recovered, only to be invaded again in 1940 and to suffer afresh during the German occupation of 1940-45.

Belgium is well served by railways and waterways. Notice the course of the Meuse—an important highway—through the country. An important canal links Antwerp directly with the Rhine to the south-east.

Belgium is a kingdom. The large and important area of the Belgian Congo in the heart of Africa has been a Belgian Colony since 1908.

Luxembourg is a tiny state south of Belgium and ruled by a

Grand Duke or a Grand Duchess. It has valuable iron ores, which it sends to Belgium for smelting.

QUESTIONS AND EXERCISES

1. What is a buffer state? Why is Belgium a typical buffer state?
2. Compare and contrast Belgium and Poland as regards position, boundaries, physical features, climate, people, and productions.
3. Describe the great industrial region of Belgium.

FRANCE

Next to Russia the Republic of France is the largest country in Europe as well as one of the most important. The total area is nearly 213,000 square miles, or more than twice the size of England, Wales, and Scotland, and the population is 44,000,000. France is very favourably situated, with a long coast-line opposite the coast of England, a long coast-line facing America, as well as an important coast-line along the Mediterranean. On her eastern frontier France adjoins some of the most populous and active countries of Europe—Belgium, Germany, Switzerland, and Italy—and so is very well situated for communications and trade. Remember from the sections on the continent of Europe as a whole—pp. 179–180—that France includes a large part of the agricultural plain of Northern Europe as well as a considerable part of the Alpine mountain system where water power is very important, and which has large reserves of timber as well as fine Alpine pastures and attractive scenery. Then France has the great advantage of a Mediterranean climate in the south, whilst the north has a climate like that of southern England, the west similar, but warmer. As a result products are many and varied, and the country is almost self-supporting in the matter of foodstuffs. Broadly speaking, France is not richly endowed with minerals. She has one large coalfield, that in the north of the country which is an extension of the Belgian field, and a number of small ones. Then France has vast reserves of iron ore in Lorraine and important potash deposits in Alsace. Other minerals are few. Notice the long, valuable rivers of France and how they flow, especially through lowland country so that

they can be linked by canals. Thus waterways are more important in France than they are in England (compare Germany). After the Franco-Prussian war of 1870 France lost the provinces of Alsace-Lorraine (which the Germans call Elsass-Lothringen) which were restored to France in 1918-19. The Sarre or Saarland, less than 1,000 square miles, we have already mentioned (p. 326). France was invaded by the Germans in 1940 and occupied by them until liberated in 1945.

Regions. Very roughly, France can be divided into nine regions:

- (1) Armorica, including Brittany, in the north-west.
- (2) The Paris Basin.
- (3) The Northern Coalfield.
- (4) The South-West.
- (5) The Central Plateau.
- (6) The Mediterranean Coastlands and Rhône Valley.
- (7) The Alps.
- (8) Eastern France including Alsace-Lorraine.
- (9) The Pyrenées.

Armorica is the name given to an area of old rocks in north-western France coinciding roughly with the old province of Brittany. It is an area like Devon and Cornwall and the rocks are folded into long east-west folds at the same time. Thus there are wet windy ridges and long sheltered valleys. In the latter many cattle are kept. Although the coast is indented and there are good harbours, this part has few industries, except fishing, because of the poor hinterland. *Brest* is a naval station and *Nantes* builds ships.

The Paris Basin. As in the south-east of England the rocks consist of beds of limestone, sandstone and other rocks resistant to weathering, alternating with clays, shales and sands which have been eroded to form valleys. The rocks dip towards a centre and are arranged something after the manner of a succession of saucers so that the youngest rocks are in the centre, the older forming ridges all round whilst on the margins of the basin are still older rocks. Near the centre of the basin is *Paris*, the great capital of France, on the River *Seine*. The Paris Basin is an agricultural region; the principal crops

are wheat, oats, and sugar-beet. On some of the dry chalk pastures many sheep are found but even the ridges are often made fertile by a deposit of loess which the French call *limon de plateau*. Around *Reims* it is warm enough for a special small kind of vine to grow, from the grapes of which champagne is made. The district is called Champagne and it is from this that the wine takes its name. The north-western sector of the Basin is the old province of Normandy which includes the peninsula of Cotentin with the port of *Cherbourg*. Like London, Paris is not near any great coal or iron ore field, but it is a natural centre and now has roads, railways, and waterways radiating in all directions. It has a wide range of manufactures but mostly of small articles with a high value, e.g. perfumes, leather goods, and ladies' clothes. Lower down the Seine is the port and cotton manufacturing town of *Rouen*, whilst *Le Havre* at its mouth is a port with transatlantic and trans-Channel trade. Along the coast are many favourite seaside resorts.

The Northern Coalfield is a continuation of the Belgian Coalfield and yields nine-tenths of the coal of France. Iron ore is brought from Lorraine and there are iron, steel and machinery works. The great centre is *Lille*, but there are also cotton and other textile industries at *Roubaix* and *Valenciennes*, while many smaller towns are primarily coal-mining towns. The main port of the region is *Dunkerque* (Dunkirk); the smaller ports of *Calais* and *Boulogne* facing England deal with the traffic across to England.

The South-West of France is warmer, and the vine flourishes. This is the greatest of the wine-producing regions of France. The industry centres round the port and principal town of *Bordeaux*. Wheat and maize both grow in this region; cattle are reared on the wetter grasslands, whilst sheep thrive on the slopes of the Pyrenees. The Landes, on the coast south of Bordeaux, are an area of sand dunes. The sand threatened to blow over fertile lands to the west and to destroy them, but forests of pines have been planted and the sands are thus anchored." The important inland town of *Toulouse* is connected by water with the Mediterranean.

The **Central Plateau** is a region of old hard rocks yielding a very poor soil. The region attracts a heavy rainfall, but the soil is so poor that the principal crop is rye, and the grasslands are only good enough for sheep. Among the old rocks lie a

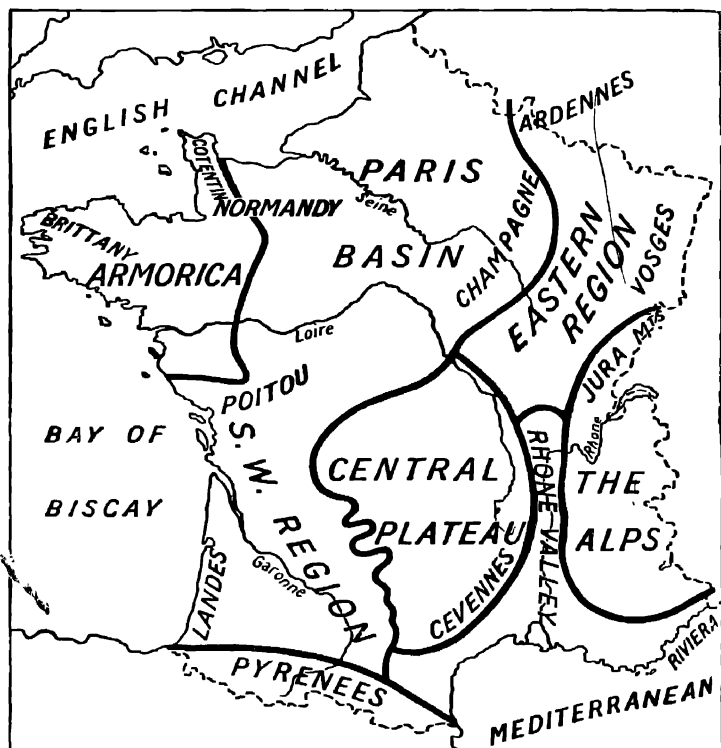


FIG. E.31.—The natural regions of France

number of small coal basins, the most important being near *St. Etienne*. A little iron ore is found and *St. Etienne* makes good steel. *Clermont-Ferrand* is important for its rubber manufactures.

The high south-eastern edge of the plateau, with some interesting old volcanoes, is known as the Cevennes.

The Mediterranean Coastlands have a typical Mediterranean climate, but the *Rhône Valley* is a little colder because of the cold wind (the Mistral) which blows down from the Alps. The olive flourishes along the coast, on soils too poor for other

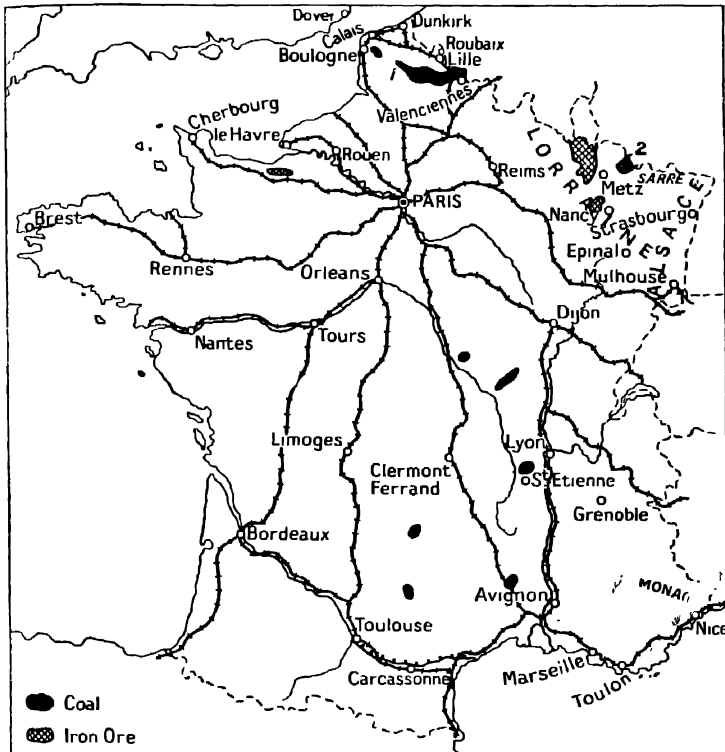


FIG. E.32.—The coalfields, railways, and chief towns of France.

1—the northern coalfield; 2—the Sarre coalfield, also shown are the small coalfields round the central plateau

crops; the vine grows over most of the region, whilst the mulberry tree is found mainly in the Rhône Valley. Numbers of silkworms are fed on the mulberry trees, and the centre of the silk industry is *Lyon* (Lyons), near the St. Etienne coalfield. Much of the raw silk for the industry is now imported from China and Japan, but Lyon remains the largest silk centre of

Europe. The great port of *Marseille* (Marseilles) is the natural outlet for the Rhône Valley though it lies to the east of the river mouth, away from the danger of silting. It has oil, candle, and soap factories which resulted, in the first place, from the local supplies of olive oil. But just as Lyon now imports raw silk for her silk factories, so Marseille imports linseed, sesamum, ground-nuts, and copra for her factories. A large proportion of the oil-seeds from the Far East goes to Marseille. Marseille



[Photo L. D. Stamp.

FIG. E.33.—What war does to cities—the principal building of a town in Northern France (Arras) after the First World War.

has now a huge trade with India and the East, including the important French territory of Indo-China. Ocean passengers from Australia, the Far East and India to England sometimes transfer from the steamers to the French railways at Marseille and are taken across France to Calais to reach London less than twenty-four hours after arriving at Marseille. Before the coming of the airplane the mails followed this route. The great shipping trade of Marseille has caused the development of shipbuilding industries. East of Marseille is the naval

sation of *Toulon*. The Mediterranean coast near Italy, known as the Riviera, is very sheltered and has warm winters. It is used in winter as a pleasure resort for Europe; the main French centre is Nice. Near it is the famous little principality of Monaco, with Monte Carlo, on the borders of Italy.

The Alps. The western end of the great Alpine mass of mountains lies in France and the highest mountain of Europe,



[Photo : Fox Photos.]

FIG. E.34.—History repeats itself—destruction in the Second World War.

Mont Blanc, is in France. Water-power is available and has led to the development of chemical and other industries. France is connected by railway with Turin, in Italy, through the Mont Cenis tunnel. There are some fertile valleys, in one of which stands *Grenoble*. The mountainous island of Corsica, birthplace of Napoleon, is like a detached fragment of the Alps.

Eastern France includes the province of Alsace-Lorraine which was lost by France in the war of 1870, but regained after the First World War. The boundary of France now runs

along the River Rhine for a considerable distance. This region contains the enormous iron ore deposits of Lorraine. The iron ore is of low grade, like the somewhat similar ores of Northamptonshire and Lincolnshire, but it can be worked cheaply. Much of the ore is sent by canal and rail to the coalfields of Northern France. But France has not really enough coal of her own to work the vast deposits of iron ore, and the coal of the nearby Sarre or Saar coalfield does not yield a suitable coke. In iron-smelting a very hard coke is needed. Bordering the

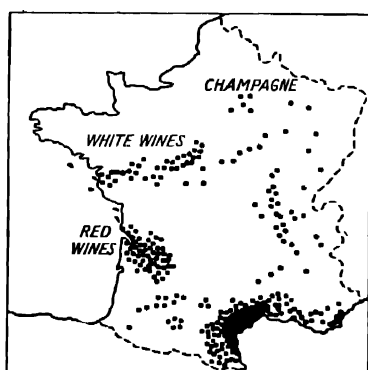


FIG. E.35.—The vineyards of France.

Note that most vineyards are found in the Mediterranean region. The northern coast is too cold for the vine and so is the Central Plateau.

Rhine Valley are the Vosges mountains. The streams flowing down from the Vosges were found to be very suitable for bleaching cotton, and a large cotton manufacturing industry has grown up, with centres at *Mulhouse* and *Epinal*. Rich potash deposits (from which valuable manures for improving poor soils are obtained) are worked north of *Mulhouse*. *Metz* and *Nancy* are other large centres of this region. *Strasbourg* is a river port on the Rhine.

The Pyrenees form a great barrier between France and Spain. Railways have been built round their eastern and western ends and later, nearer the centre, but the crossing is still difficult. There are many hydro-electric plants.

Communications of France. France is well served by railways, nearly all of which radiate from Paris (compare London). Over the lowlands of the north of France are large canals, which link up the navigable rivers. The Seine, Loire, Rhône, and their principal tributaries are all navigable and connected by canals. It is thus possible to travel from the Mediterranean Sea to the English Channel entirely by water. Bordeaux is also linked with the Mediterranean by a canal on

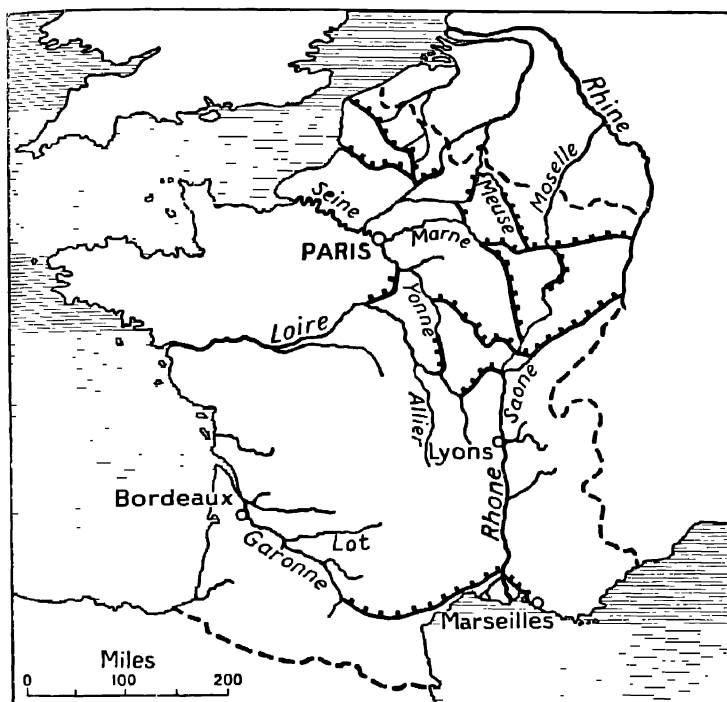


FIG. E.36.—The waterways of France.

Notice how the principal navigable rivers are linked by canals.

EXPORTS

FOOD
PRODUCTS
INCL WINE
13%

RAW
MATERIALS
24%

WOOL
2%

IRON &
STEEL
12%

CARS
5%

MANUFACTURES 63%

FOOD AND
DRINK
20%

RAW MATERIALS
COAL
12%

46%

MANUFACTURES
34%

IMPORTS

FIG. E.37.—The exports and imports of France in recent years.

which lies the important town of *Toulouse*. This waterway passes through the gap between the Central Plateau and the Pyrenees which is guarded by the old fortress of *Carcassonne*.

France has 25,000 miles of main roads known as "national roads."

Trade of France. Although France is one and three-quarter times the size of the British Isles, it has a rather smaller population (44,000,000). The foreign trade of France is about half that of the United Kingdom. Study Fig. E. 37 carefully for the principal exports and imports.

The French Community. Many parts (e.g., Indo-China) of the former French Empire have become independent but France still controls huge areas in Africa. There also, many parts are in course of attaining independence.

QUESTIONS AND EXERCISES

1. Compare and contrast the agriculture of England and France.
2. Draw a sketch-map of the Northern Coalfield Region, showing its main outlets.
3. What are the chief differences between the trade and position of the ports of Calais and Marseille?
4. Write what you can of the wine industry of France.
5. Give an account of the climate of France, distinguishing between the different parts.
6. Compare the climates of France and Scandinavia.

SPAIN AND PORTUGAL

The Iberian Peninsula (Spain and Portugal) is more than twice the size of the British Isles but contains only about half as many people. The peninsula is cut off from France and the remainder of Europe by the lofty chain of the Pyrenees. In the south, the Strait of Gibraltar between Spain and Africa is only a few miles wide. The peninsula consists of a high plateau, called the Meseta, bounded by a line of fold mountains on the north (the Pyrenees and the Cantabrian Mountains) and on the south by the Sierra Morena. The plateau has been cut into deeply by a number of rivers. One river, the Ebro, flows into the Mediterranean Sea, the remainder flow into the Atlantic Ocean. The important ones are the Douro, Tagus, Guadiana, and Guadalquivir. The north-western and northern parts of the peninsula have a good rainfall all the year round, and belong to the climatic region of North-Western Europe. But the rest of the peninsula has a Mediterranean

climate though much modified on the surface of the plateau. The rainfall is heaviest on the western side, and it is there that there are forests in the north and open woodlands of cork oak farther south. The eastern coast is dry nearly all the year, being in the rain-shadow of the Meseta.

PORTUGAL

The Republic of Portugal occupies part of the west coast. The republic includes the Azores and Madeira off the coast of Africa, and there are large colonies in Africa as well. Nearly half of Portugal is classed as waste land, and a large part of the remainder is covered with Mediterranean cork-oak forests. Large numbers of pigs live on the acorns of the oak forests. Portugal is fortunate in the range of its climate—from warm and moist in the north (A in Fig. E.38) to the southern coast or Algarve which has winter rain and in summer is nearly as hot and dry as North Africa. In the north, where the rainfall is heavier, the chief products are maize and cattle; on the mountains, rye, sheep, and goats; in the south wheat, maize, and pigs. Wine of different types is produced in many areas in large quantities but especially famous is the port-wine of the middle Douro basin. Olives for the production of olive oil and fruits such as figs, tomatoes, oranges, and lemons, are widely grown, particularly in the south. Most of the cultivation is on or near the coastal plains.

Along the coast fishing is carried on, and *Setubal* has a large trade in canning sardines.

Portugal has various minerals but little or no coal.

Portugal was once the centre of a large empire. But to-day their own country lies comparatively undeveloped, and the large remaining colonies in Africa are also awaiting development. Brazil was once a Portuguese colony.

Lisbon, the capital on the Tagus estuary, is the largest town and port.

Oporto, at the mouth of the Douro, is the port-wine port. Portugal supplies half the world's needs in cork, and exports also wine and fish. The main imports are coal and manufactured goods.

SPAIN

The Republic of Spain falls into several natural regions:

- (a) The northern coastlands, with rain all the year round and a climate influenced by the sea. (A and B on Fig. E.38).
- (b) The Meseta, or central plateau, dry and with cold winters owing to its height.
- (c) The Valley of the Guadalquivir and Southern Spain, sheltered and warm.

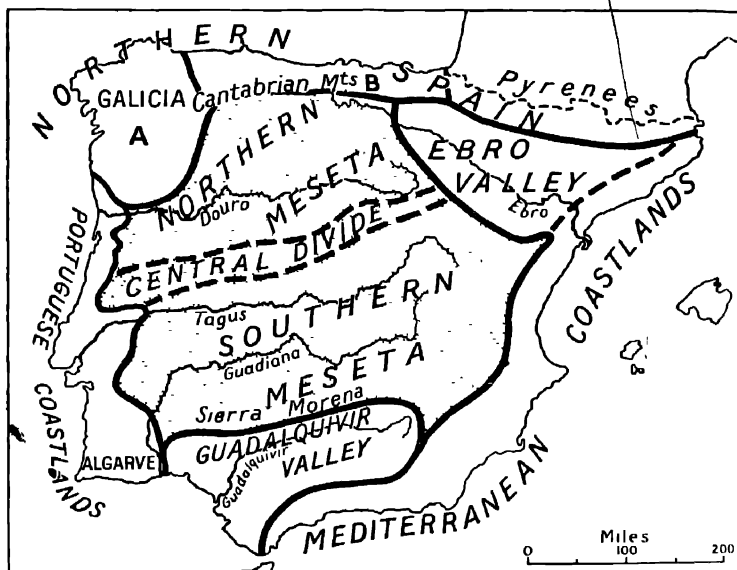


FIG. E.38.—Spain and Portugal.

- (d) The Mediterranean Coastlands.
- (e) The Ebro Valley.
- (f) The Pyrenees.

The Mountainous Northern Coastlands stretch from the Cantabrian Mountains to the sea. This is the richest and most densely populated part of Spain. Maize grows in the valleys, the rich grasslands amongst the hills are well suited to cattle, whilst the mountains are covered with pine forests. But the

great wealth of the region lies in its minerals, especially coal and iron ore. *Bilbao* and *Santander* both export good quality iron ore, much of it goes to Great Britain. The coalfields are near *Oviedo*.

The Meseta, or Plateau, covers the greater part of Spain. Its southern edge forms the Sierra Morena. Much is too dry or too infertile for cultivation and consists of rolling treeless grassy plains. On the richer soils wheat is grown and milled at *Valladolid* towards the north. Large numbers of sheep are

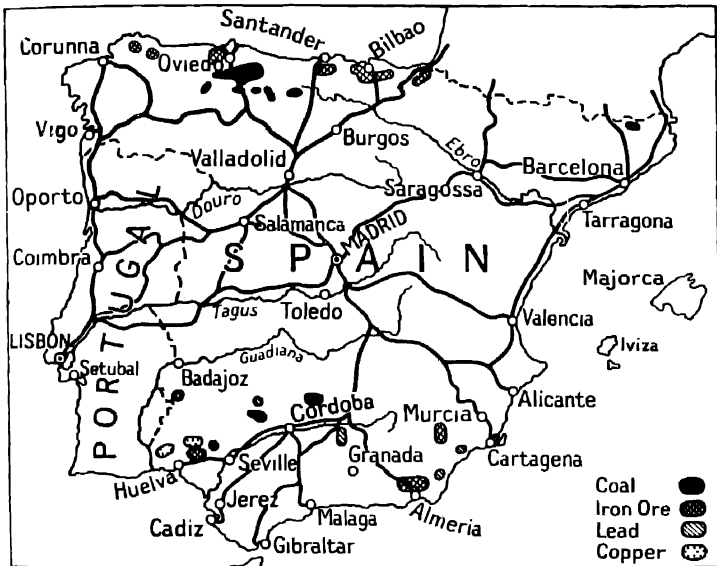


FIG. E.39.—Economic products, towns, and railways of Spain and Portugal.

kept, and are noted for their fine wool. The merino sheep, so well known in Australia, were originally found only in this region. *Madrid*, the capital of Spain, is in the centre of the plateau, nearly in the geographical centre of the country, and so a convenient centre of government. A ridge of mountains, forming a central divide, separates the meseta into two parts.

The Guadalquivir Valley and Southern Spain do not suffer from the cold winters of the plateau, and sub-tropical plants

flourish. This part of Spain is often known by its old Roman name of Andalusia. Oranges and lemons and the vine are all widely grown; the region is famous both for wine and for dried grapes, or "raisins." But the region is dry and, where possible, is irrigated. Both sugar-cane and sugar-beet are grown on irrigated land. Iron ore is mined in the Sierra Nevada, copper near Huelva, and there are other minerals including mercury. The fine old town of *Seville* is the largest in the region and, although seventy miles from the sea, the principal port. The old but modernised port of Cadiz is now used by steamers for the *Canary Islands*, which belong to

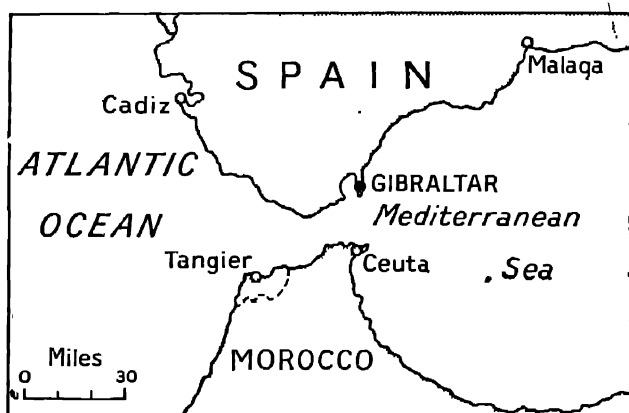


FIG. E.40.—The position of Gibraltar—the key to the Mediterranean

Spain and which grow bananas. *Jerez* (pronounced rather like "sherry") has given its name to that type of wine and is the centre of the sherry trade.

The Mediterranean Coastlands are famous for their fruits—grapes, olives, oranges, and lemons. The coast-lands lie in the rain-shadow of the plateau and so are dry, but the hill-sides are carefully terraced and any available river water is used for irrigation. *Malaga* serves the southern slopes of the Sierra Nevada. *Gibraltar*, the "Key to the Mediterranean," is a British possession. Notice its position very carefully. The town is built on the western side of a small rocky peninsula

—the Rock of Gibraltar—and has a fine harbour. *Valencia* is the centre of an important irrigated area famous for oranges and *Cartagena* is another fruit port; *Murcia* is an inland centre.

The Ebro Basin opens out on to the Mediterranean coast. It is colder than the coast, and the chief centre is the bridge town of *Saragossa* or *Zaragoza*. But more important is *Barcelona*, the largest port and chief manufacturing centre of Spain. Cotton and woollen goods and machinery are made.

The region round *Barcelona* is known as *Catalonia* and the people speak a language quite different from Spanish. The area benefits by hydro-electric power generated in the *Pyrenees*.

The Pyrenees form a very marked barrier between Spain and France. It is only with difficulty that a railway was built round the eastern end and another round the western end and only since the First World War have two railways been built across the mountains. Spain was thus greatly cut off by natural barriers from the rest of Europe, and in the Middle Ages came much under the influence of the Moors of North Africa. Several of the cities in Southern Spain, such as *Murcia*, were built by the Moors.

Madrid is the natural centre of the railways of the peninsula. The principal exports of Spain are wine, fruits, metals, and ores.

Spain, like Portugal, was once the centre of a great empire, but the old colonies, including a large part of South America, have become independent. Meanwhile, Spain itself is comparatively undeveloped, and, until recently, has remained backward amongst the countries of Europe.

Belonging to Spain are the *Balearic Islands* in the Mediterranean, the *Canary Islands*, *Fernando Po* and other small islands with a neighbouring tract of the *Guinea Coast*, and an area (*Rio de Oro*) largely desert in West Africa.

QUESTIONS AND EXERCISES

1. Draw a sketch-map of the Iberian Peninsula, showing the main physical features.

2. France and Spain are about the same size both touch the Mediterranean and the Atlantic. Why should the foreign trade of Spain be only one-sixth that of France?

3. Compare the industries and products of the Northern and Mediterranean coasts of Spain.

4. Account for the importance of: Lisbon, Madrid, Barcelona, Bilbao, Valencia

5. Discuss the political importance of the Pyrenees.

ITALY

Italy occupies a peninsula stretching southwards of the Alps into the Mediterranean. The country is shaped like a man's leg, and opposite the toe is the large island of Sicily. Running down the centre of the leg is the central "bone"—the Apennine Chain. Italy is about the same size as the British Isles and contains almost as many people. Italy is thus thickly populated. It is, on the whole, a country poor in natural resources so that the people generally are poor. For many years prior to the outbreak of the Second World War large numbers of Italians used to emigrate. Some went temporarily to find work in France and other parts of Europe. Large numbers had settled in the United States till that country restricted the numbers who were allowed in: others settled in South America. Only a few could emigrate to Italy's own colonies because these were mainly desert—Libya, Eritrea, and Somaliland in Africa. In 1936 Italy, under the dictator Mussolini, attacked and conquered Abyssinia and began spending much money there in road building to open up the country and to plant Italian colonies. On Good Friday 1939 Italian troops occupied Albania and later that year Italy entered the Second World War as the ally of Germany. The Italians were soon driven out of Abyssinia and later out of Africa altogether. In 1943 Anglo-American forces invaded Italy itself defeating the Italians in 1944. Italy's king abdicated and the country, shorn of its colonies, became a republic.

Italy falls into three divisions:

(a) The southern slopes of the Alps in the north, with the Italian Lakes.

- (b) The great plain of Lombardy, or the Plain of the River Po.
 (c) Peninsular Italy.

Peninsular Italy has a typical Mediterranean climate—hot dry summers and warm moist winters—but the plain of



FIG. E.41.—Italy.

Land over 1,000 feet, dotted. The natural regions of Italy are marked 1, 2, 3. The heavy lines indicate that the coastal strips are different from the main mass of the Apennines.

Lombardy is cut off from the influence of the Mediterranean by the Apennines, and has very cold winters with most rain in spring or summer. In winter the north of Italy suffers from the cold Bora, a wind blowing down from the mountains; in summer the south of Italy suffers equally from the hot dusty Sirocco, coming from the Sahara.

The Italian Slopes of the Alps face towards the south and towards the sun, and so are much warmer than they would otherwise be. Many of the valleys run north and south, and are blocked by moraines at the southern end, giving rise to the beautiful Italian lakes visited yearly by thousands of tourists. In the sheltered valleys many Mediterranean fruits, including the vine and the olive, can be grown. The Alps descend abruptly to the plains, and along the borders are many towns such as Como using electric power obtained from the swift Alpine streams. This power is distributed over the northern plain.



FIG. E.42. —The ricelands of Italy.

The Plain of Lombardy is the most important part of Italy, and supports nearly half the population. The principal food crops are maize and rice. As in the monsoon lands, there is plenty of rich alluvial flat land suitable for rice. Italy is the only country in Europe where large quantities of rice are grown. The winter climate is too cold for most Mediterranean trees, but the mulberry tree flourishes and is used to feed large numbers of silkworms. There are many industrial centres, *Milan*

being the largest. *Milan* started as a silk manufacturing town, but now has extended its industries to cotton and woollen goods. The cotton and wool have to be imported. Hydro-electric power is available from the Alps, but no coal exists. The railways through the Alpine tunnels converge on the plain, especially on *Turin* and *Milan*, which have developed railway workshops and a trade in machinery. *Turin* also makes motor cars. The famous old town of *Venice*, built on an island and with canals instead of streets, is the port for the eastern part of the plain. *Bologna* is a route centre near the south-eastern margin of the plain.

The great port for the western half of the plain is *Genoa*.

Notice how it is reached through gaps in the mountains of the Ligurian Alps. It has shipbuilding, iron, and cotton industries.

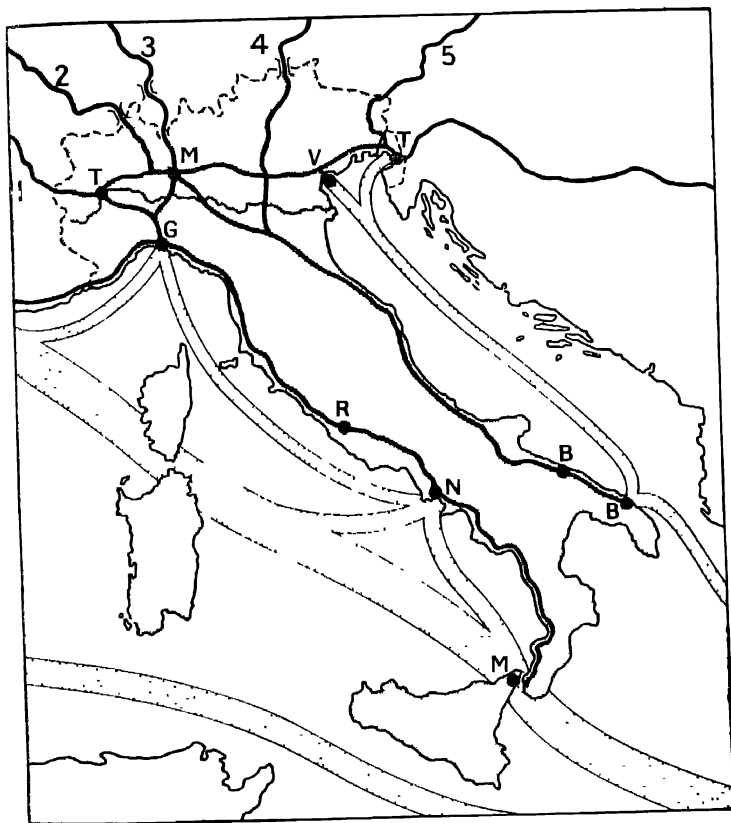


FIG. E.43.—The railways and steamship routes of Italy.

Identify carefully each of the towns marked by letters and each of the railways through the Alps marked by numbers.

The coastlands near Genoa have a Mediterranean climate and so are like peninsular Italy.

Peninsular Italy is a varied region, but mainly mountainous. The mountains are often dry and barren, and most important are the small plains along the coast, where most of the people

live. Unfortunately many of these were swampy and malarial, but in the years between the wars great progress was made in draining them, so that there are many new fertile and healthy tracts of farmland. The chief grain is a hard wheat from which macaroni is made. Olives are grown, olive oil being much used by the Italians; also grapes, from which Chianti wine is made, figs, oranges, and lemons. The plaiting of wheat straw

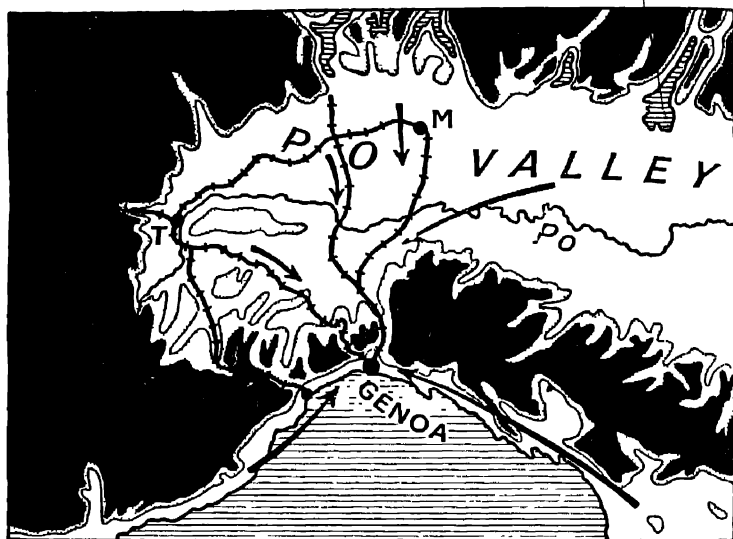


FIG. 1. 44.—The position of Genoa.

Notice the gap to the north of the town, followed by the railway to M (Milan). The smaller town to the west of Genoa is Savona. Notice the gap leading to T (Turin). The arrows show the railway routes along the coasts and from the Po Valley. Land above 1,500 feet, black

was carried on at *Florence*, a famous old city and ancient seat of art and learning. The island of Elba has small deposits of iron ore of good quality, and near the west coast of Italy are large deposits of brown coal. *Naples* has developed cotton mills, but *Rome*, the capital, though a progressive modern city with fine buildings, is famed for the monuments and relics which date from the days of the Roman Empire. Part of Rome now forms the independent Vatican State, a tiny area including the Vatican, or residence of the Pope, and the great

cathedral of St. Peter. Near Naples, which is also a large port, are the famous volcano of Vesuvius and the ruins of Pompeii, much visited by tourists. The island of **Sicily** is noted for its fruit (especially lemons) and silk; its largest town, *Palermo*, carries on iron smelting; *Messina* has only recently recovered from its destruction by earthquake in 1908. The great volcano of Mt. Etna dominates the island and sulphur from the volcanic regions is a noteworthy product. The large island of **Sardinia** has rich mineral deposits, but is still only partly developed.

It is interesting to notice how railways in Italy are controlled by the mountain chains. Study the atlas carefully and see how they converge on the plain of the Po, and how few important railways cross the Apennines. In the south, Brindisi was previously used as a port of call for mail steamers from the East, but this service was discontinued and the mails were landed at Marseilles in France. Bari is a rapidly growing port farther north.¹

The leading exports of Italy are fruits (almonds, lemons), vegetables, cotton goods, woollen goods, artificial textiles, motor cars, and tyres. Italy imports foodstuffs, raw cotton and wool, and metals.

MALTA

Between Sicily and the nearest point of Africa lie the two islands of Malta and Gozo. Just as Gibraltar is the key to the Mediterranean, these islands are the key to the route between the eastern and western parts of the Mediterranean. They have been British since 1814. The islands are dry and rather barren, and suffer badly from the hot Sirocco wind from the Sahara. The land is very carefully cultivated in small fields and, where possible, by irrigation from wells; but enough food cannot be grown for the third of a million inhabitants, and much has to be imported. The importance of the islands is in their position—on one of the great trade routes of the world. Malta has a fine double harbour (at Valetta), used as a naval

¹ The names used above for Italian towns are what are known as English conventional names. We ought really to use the names the Italians use themselves. The same is true of other countries. The Italian names used in this section should be *Milano*, *Turino*, *Venezia*, *Genova*, *Firenze*, *Napoli*, and *Roma*.

base. British air liners as well as ocean liners sometimes call at Malta on their way to India and the Far East.

QUESTIONS AND EXERCISES

1. Draw sketch-maps to show the importance of the position of (a) Genoa, (b) Milan, (c) Trieste, (d) Malta.
2. Write an account of the climate of Italy.
3. Compare and contrast the Peninsula of Italy with Scandinavia.
4. Compare Italy with Spain as regards position, physical features, climate, and productions.
5. Why is the richest and most thickly populated part of Italy centred in the Po Basin? What are the chief industries?

ALBANIA

The mountainous state of Albania, between Yugoslavia and Greece, is the wildest region in Europe. Until 1925 it had no railways, scarcely any roads, no banks and no money, and practically no foreign trade. The wild hill tribesmen provided for their own needs, and large areas of the country were waste land. Rapid development took place largely under Italian influence, and on Good Friday 1939 Italian troops occupied the country. In 1945 the country was liberated and in 1946 became a republic. The capital is Tirana, the chief port Durazzo.

GREECE

Greece is a mountainous country occupying the southern part of the Balkan Peninsula. It really consists of three parts:

(a) The northern portion, stretching from the Adriatic Sea, across the Balkan Peninsula and round the Ægean Sea. Along the Ægean Sea are the plains of Thessaly, Macedonia, and Thrace separated by mountain spurs.

(b) The southern portion, a peninsula with an isthmus so narrow that it has been cut across by a canal only four miles long.

(c) The archipelago and the large island of Crete.

Greece is so mountainous that only one-fifth can be cultivated. Most of the mountains are dry limestone ridges, often nearly bare, but forests cover them where conditions are better, as on the west of the main ranges. The climate is typically

This map illustrates the geographical and political landscape of Eastern Europe and the Balkans. Key features include:

- Political Boundaries:** Dashed lines delineate the borders of Hungary, Romania, Bulgaria, Yugoslavia, Greece, and Turkey.
- Major Cities:** Budapest, Bucharest, Sofia, Belgrade, Tirana, Athens, and Istanbul are labeled.
- Geographical Features:** The Danube River, the Black Sea, the Adriatic Sea, and the Aegean Sea are shown. Mountain ranges like the Balkan Mts and Rila-Rhodope Mts are indicated.
- Elevation Legend:**
 - Dark shading: Above 3000 Ft
 - Medium shading: 1000 - 3000 Ft
 - White: Below 1000 Ft
- Scale:** A scale bar at the bottom left indicates distances in miles (0, 50, 100, 150).

FIG. E.45.—The countries of the Balkans.
Part of northern Transylvania has been ceded to Hungary.

grains are wheat, barley, and maize, but Greece is particularly famous for its fruits. The staple export is currants, the dried fruit of a vine with very small grapes. The greater part of the currants come from the west coast. Olives are abundant; nuts are grown in large quantity and so are figs, oranges, and lemons. Tobacco is also an export crop. There are many sheep in the northern regions and wool is produced. There are a few mineral deposits in Greece, but they are not very large. Greece is mainly an agricultural country, and the industries depend directly on the products of the soil. The principal industries are the preparation of olive oil, wine, cheese, leather, and soap.

Greece is a country with a long and wonderful history, which is partly the result of its situation, almost between Europe and Asia near the ways which carried the traffic between those continents. The Greeks were one of the leading peoples of the world between two and three thousand years ago, and their empire extended as far as Persia and even to India. Remains of ancient cities are scattered over the country and render it of great interest. The capital, *Athens*, has been a famous city for nearly three thousand years. Mount Ida in Crete was a famous mountain in early European history, whilst the mountain of Athos, near Salonika, remains a religious colony of Christian monks even to the present day. Notice the coast-line of Greece; its deep sheltered harbours and almost tide-less waters helped the early Greeks to become good sailors and later to develop a large merchant navy. A notable port is *Salonika*, through which passes much of the trade of Yugoslavia. The ancient town of Athens has the modern port of *Piræus* close by, with a fine natural harbour. *Patras* is the great currant port. *Candia* is the principal town of Crete.

TURKEY

Until 1914 the Ottoman or Turkish Empire covered large tracts of country inhabited by peoples of many different nationalities. After the First World War of 1914-18 Turkey was consolidated as a Republic consisting almost entirely of Turks. In Europe Turkey now possesses only a limited tract

of land stretching from the great city of Istanbul (Constantinople) to Edirne (Adrianople) and the Maritza River. The importance of Turkey's position, as guarding the entrance to the Black Sea, first through the narrow Dardanelles, then through the Sea of Marmara and then the narrow Bosphorus, should be noted.

SWITZERLAND

Switzerland is a small republic situated right in the heart of the mountains of Europe. Its area is only 16,000 square miles, or a little over half the size of Scotland. Although half the country is occupied by high mountains which cannot be used, the population is about 5,200,000. Switzerland is a federation of a number of small states or cantons which has existed since 1291. Some of the people speak German, some French, some Italian, and a few Romansch, so that the country has four official languages.

Switzerland falls into three divisions:

(a) The southern half forms part of the main chain of the Alps and is very mountainous.

(b) In the north is a small strip of the Jura Mountains.

(c) Between the two lies the Swiss Plateau.

Most of the cultivated land is found on the Swiss Plateau, and there most of the people live. The country is not naturally very fertile, but the people have worked hard and have used every inch which can be used. The most important occupation is dairy farming, and Switzerland is famous for its cheese and condensed (or tinned) milk. In the warm weather the cattle live on the grass on the mountain sides; in the cold weather, when the mountains are snow-covered, they are brought down to the valleys. The word "alp" means a mountain pasture. Switzerland has no coal, but has developed its water-power. Nearly all the railways have been electrified and many of the factories are operated by electricity. Transport is expensive, and so Switzerland has specialised in the manufacture of small objects. Watches and clocks, for example, are made at *Neuchâtel* and *Geneva* and in the small

towns of the Jura Mountains. Electrical machinery is made at *Winterthur*. Similarly, fine silk goods are made at *Zurich*, *Basel* (the riverport on the Rhine), and *Berne* (the delightful old capital). Milk is canned at *Vevey* and many other places.

The mountains of the Alpine zone are very beautiful, and every year huge numbers of tourists visit Switzerland from all parts of Europe. They go in winter for winter sports, and in summer for mountain climbing, walking, sight-seeing, or simply resting. The tourists bring much wealth to the country and

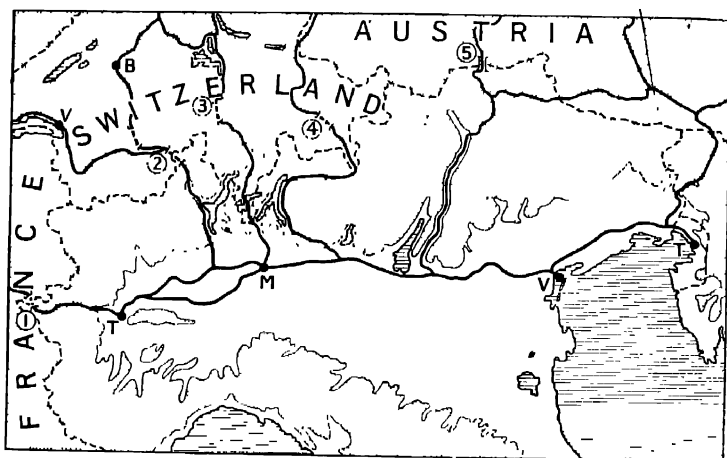


FIG. E.46.—The railways through the Alps.

Land over 1,000 feet, dotted. T—Turin, M—Milan, V—Venice, T—Trieste. In Switzerland, V=Vevey, B—Berne. Routes: 1—Mont Cenis, 2—Simplon 3—St. Gotthard, 4—Bernina, 5—Brenner.

support the large numbers of hotels. Such towns as Lucerne, Lausanne, and Montreux depend almost entirely on visitors. Many of the valleys which face south are warm (such as those round the "Italian" lakes, part of which lie in Swiss territory) and are rendered warmer by the Föhn winds. The Föhn winds blow down from the mountains, the air being compressed and warmed by its rapid descent.

Switzerland imports raw materials (cotton, silk, and wool) as well as metals and foodstuffs (wheat, sugar, and vegetables). The exports are manufactured goods (fine cotton and silk goods,

watches and clocks, and machinery), as well as cheese and condensed milk.

Switzerland lies at the meeting point of many routes. *Geneva* was made the headquarters of the League of Nations and is a favourite place for international conferences. Two important railway tunnels pass through the Alps from Switzerland—the Simplon and St. Gotthard. Two other important railway routes through the Alps are outside Switzerland—one to the west connecting France and Italy (Mont Cenis Tunnel), the other to the east connecting Austria and Italy (Brenner Pass).

AUSTRIA

Before the First World War of 1914–1918 there was a large empire in central Europe known as Austria-Hungary. The empire was ruled by the Austrians, a German-speaking people, and the capital was Vienna. Many different peoples were included in the empire, and many of them were very unhappy. And so, at the close of that war, the empire split up into a number of separate countries.

The three new countries carved out of the old empire were the Republic of Austria, the Republic of Czechoslovakia, and Hungary, whilst other parts of the old empire passed to Poland, Roumania, Yugoslavia, and Italy. The Republic of Austria is only about the size of Scotland and inhabited by about 7,000,000 German-speaking people. It is a small unit to stand on its own, and after nearly twenty years of independent existence it was annexed by Germany in 1938. It was liberated in 1945.

Austria is almost entirely a mountainous country, and includes the eastern end of the Alps (the Tirol and the Dolomites). Cutting through the east of the country is the Danube, and the valley of the Danube is the most important part of the country. Just where the Danube leaves the mountains and enters the Hungarian Plain lies *Vienna*, the old capital. Vienna is conveniently centred on a natural meeting place of routes in the heart of Europe. More than one-fourth of all the people

of Austria live in Vienna. Other towns are Graz and Linz. Salzburg is a delightful old town famous for its annual festival.

Austria has iron ore and a little coal, also an oilfield in the east, much forest wealth, and some fine Alpine pastures. It has manufactures in Vienna but must import some foodstuffs.

HUNGARY

In many respects Hungary is exactly the opposite of Austria. It is a little larger and has a few more people, but whereas



FIG.E.47.—The countries of Central Europe carved out of the old Empire of Austria-Hungary in 1919.

Austria is almost entirely mountainous, Hungary is almost entirely a plain. The Plain of Hungary, running through the centre of which is the Danube, is shut in on all sides by mountains. As a result of the wall of mountains, Hungary is cut off from the moderating influence of the sea and has a continental climate of considerable extremes. The people of Hungary, known as Magyars, are essentially agriculturists. The natural vegetation of the plain is steppe land and there are very few trees. But the natural grassland has largely disappeared. Some of the soil is poor, especially in the north, and here are large grassy plains or puszlas. Rye, oats, and barley are widely grown. But on the richer land farther south wheat and

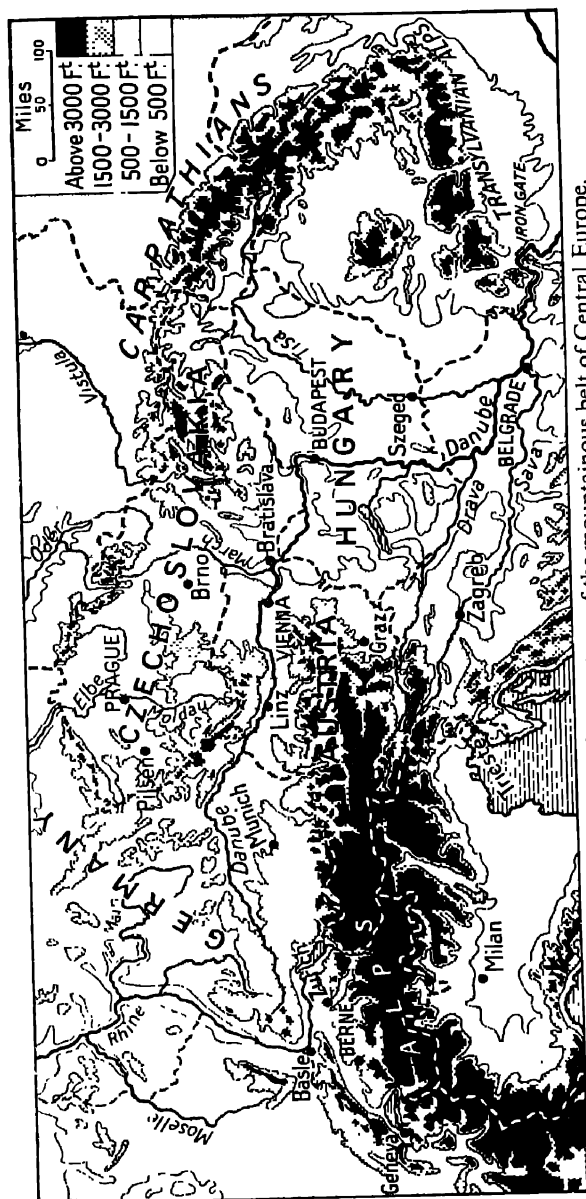


FIG. E.48.—Map showing the countries of the mountainous belt of Central Europe.

Notice particularly the course of the Danube. It rises in southern Germany, passes through the north-east of Austria (where the capital, Vienna, is situated on the river), and is joined by the March at Bratislava (the great river port of Czechoslovakia). For a short distance it forms the boundary between Czechoslovakia and Hungary and then passes right through the plain of Hungary. It then passes through Yugoslavia (where the capital, Belgrade, is on the river near its junction with the important tributary the Sava). The Iron Gate is shown on this map where the river passes through the mountains. It then forms the boundary between Bulgaria and Roumania and reaches the Black Sea through Roumanian territory. This international river is navigable from Ulm in Germany right to the sea. Some territory shown as Roumania on this map has been added to Hungary.

maize are the main crops, and the yield of good quality wheat is high. Sugar-beet is also grown. Many cattle are kept and fed upon fodder crops or corn, specially grown. Many of the industries of Hungary are connected with agriculture—flour milling, sugar making, and distilling.

Hungary has deposits of good coal in the north-west and at Pecs in the south-west, and also deposits of lignite, but has little or no iron ore or other minerals.

Budapest, the principal town, really consists of two towns, one on either side of the River Danube. It is situated just where the Danube passes through the only hill range in Hungary, and where the river can be bridged. This hill range separates Hungary into three parts. The fertile basin to the north is known as the Little Alfold. The hills of the ridge have some slopes facing south famous for their vineyards. To the south lies the main plain or Great Alfold. Budapest is an important railway junction, and the natural collecting centre of the whole country, and has recently developed manufactures, especially of electrical machinery. The Danube and its tributaries are used for transport. *Szeged*, on the River Tisa, is the largest town in the south of Hungary.

CZECHOSLOVAKIA

Another country which arose in Europe as a result of the First World War is Czechoslovakia. Before 1918 it was part of the Empire of Austria-Hungary. It is a mountainous country in the heart of Europe. In 1938 parts were transferred to Germany, Poland, and Hungary. The remainder was seized by Germany in 1939 and divided into the protectorates of Bohemia-Moravia and Slovakia, corresponding to the three parts described below. The country was liberated in 1945 and its independence and earlier frontiers restored except for the loss of a small tract to Russia in the east. The three regions are:

(a) The Czech Plateau (Bohemia), surrounded by mountains. The plateau is drained by the River-Elbe and its tributaries, the Moldau and Eger. The Elbe flows through a gap in the north and then through Germany.

(b) The valley of Moravia in the centre cuts the country in half. In the south the River March flows southwards and joins the Danube. In the north the River Oder cuts through the mountains by the Moravian gap and passes through Silesia to the Baltic Sea.

(c) The mountainous mass of Slovakia in the east consists of the slopes of the Carpathians and the numerous mountain valleys.

Study these three divisions in Fig. E.49. It is very difficult to govern a country which is so divided by nature into separate

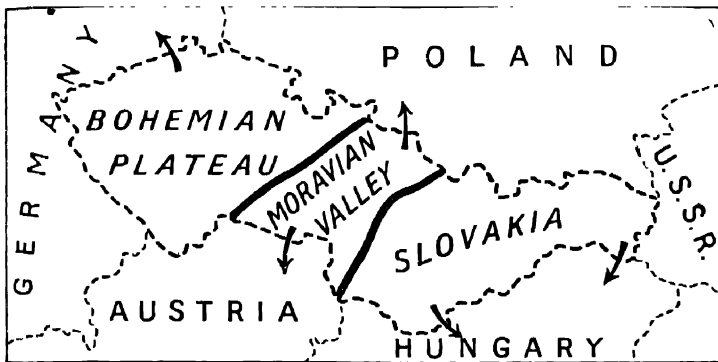


FIG. E.49.—The natural regions of Czechoslovakia. The arrows show the natural outlets of each region.

The Plateau of Bohemia is the old name of the Czech Plateau

parts, but the people are kept together by a strong national feeling and a desire to make their country successful. Czechoslovakia quickly became the most efficient of the new countries of Europe, and one of the most highly developed territories of the continent.

The **Czech Plateau** has several coalfields and various minerals occur in the surrounding mountains. The broad valleys of the rivers which drain the plateau—the Moldau and the Elbe—have very rich alluvial soils and produce crops of very high quality. Potatoes and wheat form the staple food of the people, but barley is grown for brewing (Pilsener beer at Pilsen or Plzn) and sugar-beet for making sugar. Cotton mills,

glass and chemical factories have sprung up on the coalfields, whilst paper mills and saw mills are found near the forested mountains where water-power is available. Iron ore is found between *Praha* and *Pilsen*, and both these places have iron and steel works, whilst *Praha* (Prague or Prag), the capital, has manufactures of many kinds. In the higher and poorer parts of the plateau rye, oats, and barley take the place of wheat.

The **Moravian Lowlands** have also good agricultural lands where barley and sugar-beet are grown and, in the south, maize and fruits. But the lowlands have rich coalfields.



FIG. E.50.—The railways of Czechoslovakia.

Notice the main railway running from east to west. The old railways centred on Vienna or Budapest

though the very rich Silesian coalfield is now almost entirely in Poland. The coalfields have attracted manufactures—woollen goods and machinery are both made at Brno. At Zlin are the Bata boot and shoe factories—the largest in the world. The Moravian Lowlands have two outlets—one to the south through the river port of Bratislava on the Danube; one to the north through the Moravian gate.

The **Carpathians** are largely covered with valuable forests and many places are rich in minerals. They require development. In the mountain valleys barley, sugar-beet, and potatoes are grown, whilst numerous cattle and sheep flourish

on the mountain pastures. The people here are the Slovaks; they are less prosperous than the Czechs.

Communications and Trade. Czechoslovakia is in an unfortunate position regarding communications. Until recently there was no railway from one end to the other. The natural outlet of Bohemia is down the River Elbe through Germany to Hamburg. The outlet of Moravia is down the Oder to Stettin, or through Bratislava on the Danube. The railways from Bohemia and Moravia centre on Vienna in Austria, and those from Slovakia centre on the Hungarian capital of Budapest. Thus the trade of Czechoslovakia passes through many different countries and in many directions. The trade is important: the imports are raw materials, such as cotton and wool, and foodstuffs; the exports, apart from beet-sugar, are mainly manufactures, such as cotton goods and yarn, woollen goods, iron goods, and glassware. Thus Czechoslovakia is, or was before the Second World War, in some respects a rival of Germany and of Britain.

QUESTIONS AND EXERCISES

1. Draw a sketch-map to show the main gateways leading out of Czechoslovakia.
2. Describe fully why Czechoslovakia is a difficult country to govern.
3. What are the chief industries in the western part of Czechoslovakia, and why are they carried on there?

YUGOSLAVIA

Yugoslavia is another of the states which arose after the First World War from the break-up of Austria-Hungary. It consists of the old kingdoms of Serbia, Bosnia, and Montenegro, together with a broad tract of land along the Adriatic Sea as far as the Italian border. The Peninsula of Istria was long a disputed territory because the country people are mainly Yugoslavs; the townspeople include many Italians. It was awarded to Yugoslavia, together with the ports of Fiume and Trieste (with reservations) in 1947¹. The area of Yugoslavia (which means the country of the South Slavs) is roughly the same as Great Britain, and the population about 18,000,000.

¹ Trieste remained under Allied Military Government until 1954, when the troops were withdrawn. The city was divided between Italy and Yugoslavia.

The country falls into four parts, very different from one another:

- (a) The mountainous region of the Adriatic Coast or Dalmatia and the forested mountains of the old Bosnia.
- (b) The north-western corner, or Slovenia, lying amongst the Alps.
- (c) The northern plain—part of the Hungarian plain.
- (d) The southern mountainous region—part of the Balkan Peninsula (the old Serbia).

The Adriatic Coast, or Dinaric Region, consists of the fold ranges of the Dinaric Alps. Most of the hills are of limestone. Great underground channels have been formed in the limestone by the action of water, and much of the drainage is now below the surface. The natural result is that the surface is dry and barren, and the special name of "karst," or "karstlands," is given to this type of country. The ranges run parallel to the coast, and so it is difficult to cross them, and it is difficult to reach the Adriatic Sea from the heart of the country. But the coast is very beautiful and in the days when Venice was a great power a number of fine cities such as Ragusa (Dubrovnik) were built. Some of the islands along the coast still belong to Italy. These coastlands have a Mediterranean climate and, although the limestone soils are poor, the vine and other Mediterranean fruits are grown. In the more favoured valleys, where water is available and the soil is better, varied crops are grown and often the tiniest hollow, surrounded by barren rocks, is used.

Slovenia is a small region, but has fine forested mountains, mineral deposits, and beautiful scenery. It is occupied by spurs from the Alps and on the plain is the town of Ljubljana.

The Northern Plain, entirely cut off from the influence of the Mediterranean, has a continental climate—hot summers and cold winters. But the soil in many parts is rich and much wheat and maize are grown, together with tobacco and sugar-beet. Zagreb is the principal town and has industries connected with the local agriculture. Plums are grown on some

low hills to the south and dried as prunes. This plain joins, and is really part of, the great Plain of Hungary.

The Southern Region is large and varied, highest in the south and sloping on the whole northwards towards the Danube. The hills are sometimes forested, at other times clothed with mountain pastures suitable for cattle and sheep. There are deposits of iron, lead, and other minerals in places. But the most important parts of the region are the sheltered valleys, where wheat, maize, and fruits flourish. Large quantities of plums are grown and dried for export. The dried plums, or "prunes," are much used in other parts of Europe. They are also used in making a kind of brandy, the national drink of the Serbians. Other crops include the vine, sugar-beet, hemp, and tobacco. Notice the position of the capital, *Belgrade*, at the northern end of the region on the Danube, and also *Nish*, commanding the routes to Salonika and Sofia in Bulgaria.

Communications. The state of Yugoslavia has two main outlets—one in the south through the Greek port of Salonika, the other in the north-west, where the Yugoslavs built a port at Susak next to Fiume because Fiume was Italian from 1919 to the Second World War. A still better outlet is *Trieste* which was the chief port of Austria-Hungary before it passed to Italy in 1919. Although Yugoslavia has a long coast-line with numerous harbours, the Dinaric Mountains make it difficult for the ports to serve the rich interior of the country. The chief ports down the coast are Split, Dubrovnik (old name Ragusa), from which a road and railway run through the Bosnian Mountains to Sarajevo, and Kotor (in a fiord-like gulf), which serves Cetinje and the former country of Montenegro. The state exports timber, fruit (prunes), animals, wheat, and maize, and imports manufactured goods. It is still in the main an agricultural country.

QUESTIONS AND EXERCISES

1. Show clearly the importance of Salonika to Greece and Yugoslavia.
2. At the end of both World Wars Yugoslavia and Italy each wanted Trieste and Fiume. Take each one and say which country you think should have it, and why.

ROUMANIA (ROMANIA OR RUMANIA)

Roumania includes a large part of the former Empire of Austria-Hungary. There have since been various boundary changes. It became a republic on the Soviet model in 1947. It is now roughly the size of Great Britain and has a population of about 18,000,000. Forming a great curve of mountains throughout the centre of the country, and dividing it into two distinct halves, are the Carpathian Mountains and the Transylvanian Alps. There are three natural regions (see Fig. E.45):

(a) The Wallachian Plain—the valley of the Lower Danube lying to the south-east of the mountains.

(b) The mountains forming a barrier through the country.

(c) Transylvania and the Banat, on the west of the mountains, forming a mass of hills and sheltered valleys.

The Wallachian Plain has a continental climate with hot summers, cold winters, and a low rainfall, falling mainly in early summer. It is part of the steppe lands, and is now one of the great wheat lands of the world. Huge quantities of wheat, barley, and maize are grown, with oats on the poorer lands farther north. *Bucharest*, the capital, lies in this region, *Galatz* and *Braila* are river ports on the Danube, but more important is *Constantza* on the Black Sea which is free from ice all the year. Many of the towns have developed industries connected with agriculture—flour milling, brewing, distilling, and sugar making. Bessarabia to the north was annexed by Russia in 1940.

The Mountains are forested up to 5,000 feet. On the lower slopes are beech trees, on the higher parts soft-wooded, coniferous trees grow. The logs are floated down the rivers to saw mills at Galatz. Above the forests are mountain pastures with enormous numbers of sheep.

In the foothills of the mountains, especially near Ploesti, are rich oilfields. The oil is refined at Ploesti or sent by pipe line to Constantza.

Transylvania and the Banat have valuable mineral deposits—gold, silver, copper, lead, iron, and coal—as yet little

developed. Many of the hills are wooded, large numbers of sheep are kept on the hill pastures, while cultivation is carried on in the valleys. Maize is the principal crop.

Roumania is essentially an agricultural country. Its principal exports are wheat, maize, timber, petroleum, and livestock; its imports are cotton and woollen goods and machinery.

Before leaving Roumania, notice the difficulty of getting from one part of the country to another owing to the mountains. This has hindered the construction of roads and railways. The Danube is an important thoroughfare shared by many nations, but its lower course is frozen in winter. Notice also where the Danube passes through the great gorge known as the Iron Gate, now made navigable.

BULGARIA

Bulgaria is a small and mountainous country, now a republic, lying to the north of Greece. It falls into three parts:

- (a) The Valley of the Lower Danube in the north.
- (b) The Balkan Mountains and the Rhodope Mountains.
- (c) The Valley of the Maritza.

Bulgaria lies outside the Mediterranean climate region and suffers from cold winters. Compared with most of the countries of Europe, Bulgaria is still undeveloped. Agriculture is the chief occupation of the people, and two-thirds of them depend entirely on agriculture; but the cultivation is of a primitive kind. One-third of the whole country—mostly in the two valley regions—is cultivated; rather less than one-third—mainly on the mountains—is under forests of oak and beech. Large numbers of sheep and goats are kept on the mountain pastures, and large numbers of pigs feed on the acorns in the oak forests. The principal food crops are wheat and maize; large areas are also planted with tobacco and sugar-beet. Fruit grows in abundance, especially in the sheltered valleys of the south-west. The Maritza Valley used to be famous for a very valuable perfume, attar of roses, made from roses. A little is still produced.

Sofia, the capital, is the largest town. Notice its important strategic position on the main railway route (the Orient Express Route) between Europe and Asia Minor.

Plovdiv (Philippopolis) is the centre of the Maritza Valley. In the neighbourhood mulberry trees are grown and silk worms fed on them. *Ruschuk* is a river port on the Danube; *Varna* and *Burgas* are ports on the Black Sea (Fig. E.45).

Bulgaria exports among other things tobacco and cereals, and imports cotton and woollen goods.

QUESTIONS AND EXERCISES

1. Draw a sketch-map to show the importance of the position of Sofia.

2. What countries lie in the Basin of the Danube? Discuss the importance of the river to each country through which it passes.

U.S.S.R. (RUSSIA)

Before the War of 1914–18, Russia was the largest country in Europe, and, next to the British Empire, the Russian Empire was the largest in the world. The old Russian Empire comprised one-seventh of all the land of the globe. In 1917 there was a revolution in Russia, and the emperor (the Tzar) abdicated. Some parts of the old Russia in Europe became separate, independent republics—Finland, Estonia, Latvia, Lithuania, and Poland. What was left now forms a number of republics which were grouped together as the U.S.S.R. (Union of Soviet Socialist Republics). Estonia, Latvia, and Lithuania remained separate until 1940 when they were occupied by Soviet forces and joined the U.S.S.R. Russia occupied half of Poland in 1939 and, at the end of the War in 1945, the boundary between Russia and Poland was readjusted. The Union thus consists of one very large state (the R.S.F.S.R. or Russian Soviet Federal Socialist Republic with its centre at Moscow) and a number of smaller ones¹.

A Soviet Republic is quite different from all other republics. All land, forests, minerals, livestock, factories, mines, railways,

¹ Since the end of the Second World War the Soviet Union has exercised a very strong influence over Poland, Czechoslovakia, Hungary, Roumania and Bulgaria, all of which have Communist Governments. They are often referred to, with the U.S.S.R., as the countries behind the Iron Curtain. There is very little trade with the outside world.

etc., belong to the state. Each state has a council, or Soviet, elected by the people, at the head of which is the President. The Union has a Supreme Soviet, a Council of Ministers, and a President. In a Parliament such as that of Britain there is always the party in power and the opposition which criticises: in a Soviet there is only one party so that party, the Communist Party, is all-powerful.



FIG. E.51.—A comparison of the temperatures of London and Moscow.

Moscow is far from the sea and has great extremes of temperature (continental climate). But London is, of course, in the "oceanic" type of climate in Britain.

The old Russian Empire covered $8\frac{1}{2}$ million square miles. The present U.S.S.R. is even larger and over 200,000,000 people live in its $8\frac{3}{4}$ million square miles.

Russia in Europe is an enormous country, but almost entirely flat. To the east it merges into Asia over the low mountain ridge of the Urals, in the extreme south-east are the Caucasus Mountains. The remainder is a plain, rarely more than 500 feet above sea-level. The Valdai Hills, from which the great rivers of Russia take their rise, are not more than 1,000 feet high. The greatest river of Russia is the Volga, which wanders across the country and is joined by many tributaries before it empties itself into the Caspian Sea, the largest lake in the world. More than half European Russia is in the basin of the Volga. Important rivers flowing northwards are the Northern Dvina (to the Arctic Ocean) and the

Western Dwina (to the Baltic Sea). Flowing southwards into the Black Sea are the Dniester, Dnieper, and Don.

The whole of Russia is far removed from the influence of the sea, and has a very continental climate with great extremes of temperature. Of course the north is colder than the south, but in winter the whole country is frozen except the southern Crimea.

European Russia may be divided into seven great regions, each with a characteristic vegetation. Refer to Fig. E.52 where these regions are indicated.

- (a) The Tundra in the extreme north.
- (b) The Coniferous Forest Belt.
- (c) The Deciduous and mixed Forest Belt.
- (d) The Steppes.
- (e) The Desert.
- (f) The Ural Region.
- (g) The Caucasus Region.

The **Tundra**, along the shores of the Arctic Ocean, was of little use, being inhabited only by a few Lapps and Samoyeds who wandered about with their reindeer. Owing to the warm waters from the North Atlantic Ocean, it is free from ice as far as the entrance to the White Sea, and the port of *Murmansk*, in the extreme north, has been connected with Leningrad by rail. The discovery of rich deposits of metalliferous ores, including copper and nickel, in the Kola Peninsula changed the importance of this region.

The **Coniferous Forest Belt** is still largely covered with natural forest. In the west, around the glacial lakes of Ladoga and Onega, cultivation is carried on in clearings and flax is grown. In the south-west lies *Leningrad* (formerly called Petrograd, and before that St. Petersburg). Notice the position of Leningrad on a deep inlet of the sea (the Gulf of Finland), giving access to the interior of Russia, but at the same time easily accessible by water from the industrial countries of north-west Europe. Leningrad is guarded by the island fortress of Kronstadt. The republic of Finland lies to the north of the Gulf; Estonia to the south. A fine ship canal now links the Baltic (through Leningrad) with the White

Set. The port of *Archangel*, on the White Sea, is blocked by ice for five or six months of the year.

The **Deciduous and Mixed Forest Belt** covers much land in the heart of Russia. The forest has been cleared over large areas, especially in the west, and the belt is in the main an agricultural one. The chief crops are flax, rye, barley, oats, and potatoes. Flax and linseed, together with Russian hemp, were formerly exported, but not enough grain is grown to feed the people. In the centre of this region lies *Moscow*, the capital of Russia. Moscow is the centre of the Russian railway system, and is well situated with regard to navigable rivers. Just to the south lies a coalfield, the Tula field. As a result, Moscow became the centre of a great industrial region with many cotton mills, woollen mills, and linen mills, as well as metal and engineering works. Within a hundred miles of Moscow are such large towns as Gorky, Kalinin, and Yaroslavl. To the west of this area lie the small Baltic countries of Estonia, Latvia, and Lithuania, now part of the Union.

Estonia lies to the south of the Gulf of Finland. Like the remainder of the heart of Russia, the country is a gently rolling plain covered with glacial sands and clays left behind by old ice-sheets. Nearly a quarter of the land is forested, but nearly all the remainder is cultivated, or used for pasture. The climate is too severe for wheat. Rye, oats, barley, and potatoes form the principal food crops. Flax is grown and exported, but the principal exports are timber and paper. The principal town is *Tallinn* (Reval).

Latvia occupies the land round the Gulf of Riga. The important town and port of *Riga*, on the Western Dwina, used to be one of the main outlets for northern Russia. Unfortunately Riga, being in a gulf, is blocked by ice for many months of the year, but the other ports, *Ventspils* (Windau) and *Liebaja* (Libau), are open nearly the whole year. The crops of Latvia are similar to those of Estonia; timber and flax are the staple exports.

Lithuania is larger than Latvia, but has a very short coast-line with one port, *Memel*. The principal towns are *Vilna* (Wilno) and *Kaunas* (Kovno). Vilna was in Poland until 1939.

The crops are as in Latvia; dairy produce is exported in addition to timber and flax. At the end of the Second World



FIG. E 52.—European Russia.

War Lithuania was much enlarged by the addition of former German and Polish territory.

In this way Russia secured the former German city and port of Königsberg, renamed Kaliningrad.

The Steppes of South-Western Russia are famous for their

rich black soil, which is ideal for wheat. With a climate also very favourable, this region forms one of the great wheat lands of the world, and wheat used to be sent by rail and river to the Black Sea ports, especially *Odessa*, for export. Now nearly all is required in the country. Other crops, also grown mostly for home use, are rye and barley and, in the wetter south-west, maize and sugar-beet. In the heart of this region lies the Donetz Coal Basin, larger and richer than that of Moscow. Near by at Krivoi Rog are rich deposits of iron ore, and large quantities of pig-iron are produced. Manganese ore also occurs. Big centres in the grain-growing region are *Kiev* and *Kharkov*. Much of the machinery required in agriculture is made at *Stalingrad* on the Volga, at *Kharkov*, and at Rostov-on-Don, centre for the Donetz (or Don) coalfield.

In this region the Russians built what was then the largest dam in the world, that of Dnepropetrovsk on the River Dnieper. It was destroyed by the Germans when they invaded Russia in 1941 but was rebuilt after the war and is a great source of hydro-electric power.

In the southern part of the mountainous peninsula of the Crimea the land is protected from the cold winter winds from the steppes. The climate becomes sufficiently genial for the growth of the vine, and the region is sometimes called a Mediterranean one, but it is a very small area.

The Desert. South-eastwards the fertile steppes become drier and pass gradually into the salt deserts round the north of the Caspian Sea.

The Urals are famous for their richness in minerals. A large part of the world's supply of platinum, as well as gold, copper, and large quantities of oil are obtained, as near *Perm*. A huge iron and steel industry now exists at the large new town of *Magnitogorsk*.

The Caucasus Mountain belt forms another rich mineral region, notable especially for the oilfields around Baku and Grozny. After the U.S.A. and Venezuela, Russia is the largest producer of mineral oil in the world. The oil is sent into the part of the country by the River Volga or by pipe-line from Baku and Grozny to the refineries at Batum and Tuapse on the

Black Sea and from there by steamer. There are many other minerals in the Caucasus, but they are little worked at present, except the iron ore. There are modern hydro-electric power works now.



(Photo. E. N. A)

FIG. E.53.—Cathedral of St. Basil, Red Square, Moscow.

Russia is very different from the other countries of Europe. The great churches of the Orthodox Church have a very distinctive architecture.

Communications of Russia. Russia has a large number of navigable rivers, but they are nearly all frozen over in the winter. The largest of them all, the Volga, unfortunately flows into a lake (the Caspian Sea). The rivers have been linked up by canals so that Moscow, on a tributary of the Volga, can be reached by water from Leningrad, whilst Leningrad is connected with the White Sea by the famous White Sea ship canal. A canal has been constructed from the Caspian Sea to the Sea of Azov thus linking the Caspian with the Black Sea. There are 75,000 miles of railway. The Russian railways are

of a wider gauge than those of the rest of Europe, and so trains cannot run direct from Russia to Western Europe.

Production and Trade of Russia. Russia has suffered very greatly from war, revolution, and famine. From 1917 to 1922 enormous numbers of people died from disease and starvation.

The new Russia was faced with enormous difficulties. There is the huge area of the country—such that it takes at least two weeks to get by railway from the east of European Russia to the far west of Asiatic Russia, and the difficulty of reaching nearly 200,000,000 people. Then the peasants of Russia were much less advanced than the peoples of other European countries. Over the north of the country they lived in wooden huts. They had little knowledge of machinery or modern inventions; but from 1928 to 1932 Russia carried out the first great Five Year Plan and the peasants learned how to drive tractors and use machinery of all kinds. A plan for the development of the whole country was made in advance; and it included particularly making Russia an enormous self-supporting unit—a country which could produce not only the foodstuffs and raw materials required but also all the manufactures, and thus be almost independent of the rest of the world. But money for development had to come by sale abroad of primary products—that is, food-stuffs and the products of the forests and mines. And so to help their country in the development of the Five Year Plan the people worked for very low wages, and a good deal of food was sent out of the country which the people themselves really needed. Before the First World War Russia was the world's leading exporter of wheat, oats, barley, maize, timber, and flax, and ranked second in butter. Through that War and the Revolution of 1917–18, her place was taken by such countries as Canada, the United States, Argentina, Australia, and New Zealand. Trade returns from Russia after the First World War showed exports of furs, skins, oils and timber as the leading articles, together with eggs, butter, and small quantities of other foodstuffs. The imports included raw materials, particularly raw cotton, for which the climate of the country, except in the extreme south of Asiatic Russia

(Turkistan), is unsuitable, and machinery. For some time many nations of the world found it difficult to trust the Soviet Government, for in their attempt to push forward the progress of their own country, they destroyed, or tried to destroy, many of the things which are to us most valuable, as, for example, the Christian religion. But real progress was made, and the Russians were beginning to reap the reward of their hard work. The First Five Year Plan was followed regularly by others

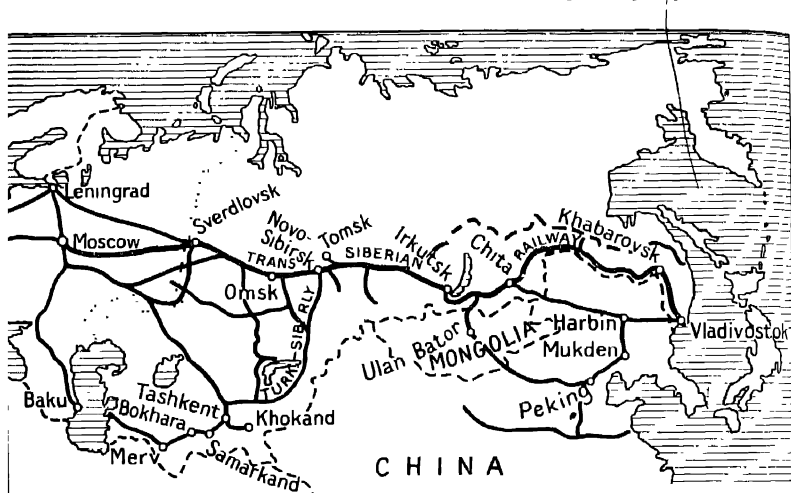


FIG. 11.54.— Communications between European and Asiatic Russia.

Notice the direct routes between Moscow and Russian Turkistan, where many tropical or sub-tropical crops can be grown. The railway between Novo-Sibirsk and Tashkent known as the Turk-Sib Railway, enables grain and timber to be sent rapidly to the thickly populated parts of Turkistan and permits the people there to devote all their energies to growing cotton, needed by the cotton mills of the towns. Notice the new rail connections between Russia and her ally Communist China.

Many new industries were established, great new manufacturing towns sprang into existence and the standard of living among the people greatly improved. Then came the Second World War. Germany attacked and invaded Russia on June 22nd, 1941 and at first swept right across the country destroying farms, villages, towns and factories as far as a line joining Leningrad, Moscow, and Stalingrad. Russia was able to carry on her industries in the new towns which had been built in Siberia and, when the War ended in 1945, started at

once to repair all the damage in her European territory. Russia is enormously rich in natural resources and many new coalfields and oilfields have been discovered and other vast mineral deposits. There are large stretches of fertile land and great forests so that Russia can be more nearly self-supporting than any other country.

The U.S.S.R. at the Present Day. We have considered separately the parts of the Soviet Union which lie in Europe (pp. 376–385) and the parts which lie in Asia (pp. 473–476). Actually the Ural Mountains which have always been considered as the boundary between Europe and Asia run through the middle of the Russian Soviet Federal Socialist Republic (R.S.F.S.R.) which occupies half the total area of the Union. There are 4 other republics in the Union.

The *Ukraine* (capital, Kiev) covers the very rich farm lands, including the Black Earth region, of the southern European area and has over 40,000,000 people mostly speaking the Ukrainian dialect. The republic of *Moldavia* in the south-west was formerly partly in Roumania. *Byelorussia* or White Russia (capital Minsk) includes those areas in the west which formed part of Poland before the Second World War. *Lithuania* (capital Vilnius, Vilna or Wilno), *Latvia* (Riga) and *Estonia* (Tallinn) described on p. 379 now have the status of republics within the Soviet Union. *Georgia* (Tbilisi), *Azerbaijan* (Baku) and *Armenia* (Yerevan) shown on Fig. E52 and noted on p. 479 share the mountainous country of the Caucasus and Trans-Caucasia. In the dry heart of Asia (p. 476) live many peoples—in all over 20,000,000—who speak languages quite different from Russian and who are mainly Muslims. They are organized in five separate republics but generally referred to as Soviet Central Asia, including also the great steppelands.

In 1956 there were in the U.S.S.R. 134 towns with over 100,000 people each; Moscow had nearly 4,000,000 people, Leningrad over 3,000,000 and Kiev nearly a million. Several even of the very large towns had been built entirely since 1930. In production it is probable that the U.S.S.R. grows more wheat, rye, barley, and oats (but not maize) than any other country and in the output of coal, iron, and steel comes second to the United States, in gold second to South Africa and in oil third or fourth.

QUESTIONS AND EXERCISES

1. Say all you know about the present form of government in Russia. How does it differ from other governments?
2. What are the chief methods of transport in Russia?
3. What difficulties does Russia encounter in the exportation of her products? How does she overcome them?
4. What do you know of Russian manufactures?

EUROPE (GENERAL)

QUESTIONS AND EXERCISES

1. Describe and account for the movement of the centres of European civilisation northward.
2. Draw a sketch-map of Europe, marking the chief railway routes.
3. Describe briefly the chief fold mountains of Europe. Draw a sketch-map to illustrate your answer.
4. Europe is sometimes called a peninsula of Asia. How far is this true?
5. What changes were made in the political boundaries of central Europe after the First World War? What reason can you give for these changes?
6. Divide Europe into natural vegetation regions, describing each one briefly.
7. Europe depends very largely on other continents for the raw materials for her industries. What raw materials does she produce herself, and where are they made into manufactured goods?
8. Describe briefly and account for the climate of the Mediterranean.
9. "The importance of a port depends upon the richness of its hinterland." Discuss this statement with reference to Marseille, Liverpool, London, Hamburg, Lisbon, Oslo, Riga, Trieste.
10. Draw sketch-maps to illustrate the position of the following towns: Paris, Vienna, Basle, Madrid, Strasbourg, Sofia, Leningrad.
11. What is meant by an international river? What rivers of Europe ought to be international? Why?
12. Compare and contrast Scandinavia and Italy.
13. Write a brief description of the Danube Basin.
14. To whom do you think Alsace-Lorraine should belong, and why?
15. Divide France into natural regions, describing one fully.
16. Write an essay on the industrial development of Czechoslovakia.
17. Give an account of the mineral wealth of Europe under the following headings: Coal, iron, copper, and lead.
18. Compare and contrast the climate of western France and north-eastern Russia.

ASIA

POSITION AND EXTENT

ASIA is the largest of all the continents and comprises nearly one-third of the land of the globe. With the exception of some of the islands of the East Indies, it is situated entirely in the Northern Hemisphere. It stretches from the frozen shores of the Arctic Ocean, far inside the Arctic Circle, into the Tropics, and the southernmost part of the mainland near Singapore almost reaches the equator. From west to east it stretches from 25° E. to 170° W.—that is, around nearly one-half of the earth's circumference. Some parts of Central Asia are more than 1,500 miles from the sea. Notice carefully on the map where the Arctic Circle cuts across the continent and where the Tropic of Cancer lies. From north to south through the centre of the continent is the meridian or longitude of 90° , which is one quarter of the way round the world from London. What is local time on this meridian?

PHYSICAL FEATURES

We can divide the great continent of Asia, according to its structure or physical features, into four big divisions. This has been done in Fig. As.2 where the divisions are :

- (1) The Northern Lowlands.
- (2) The Central Triangle of young folded mountains and the plateaus or basins which they enclose.
- (3) The Old Plateaus of the South.
- (4) The Great River Valleys.

The Northern Lowlands. These form a great triangle bordered on the north by the Arctic Ocean. Although in comparison with the rest of Asia this great area can be described as lowland, it is not a plain. In the north-east it is interrupted by mountains; in the centre is a low plateau of ancient rocks

of huge extent. In the west it is truly a lowland—a vast river plain, only separated from the Great European Plain by the low range of the Ural Mountains.

In the south-west is a small area of inland drainage, draining into the Sea of Aral and this forms Russian Turkistan. But

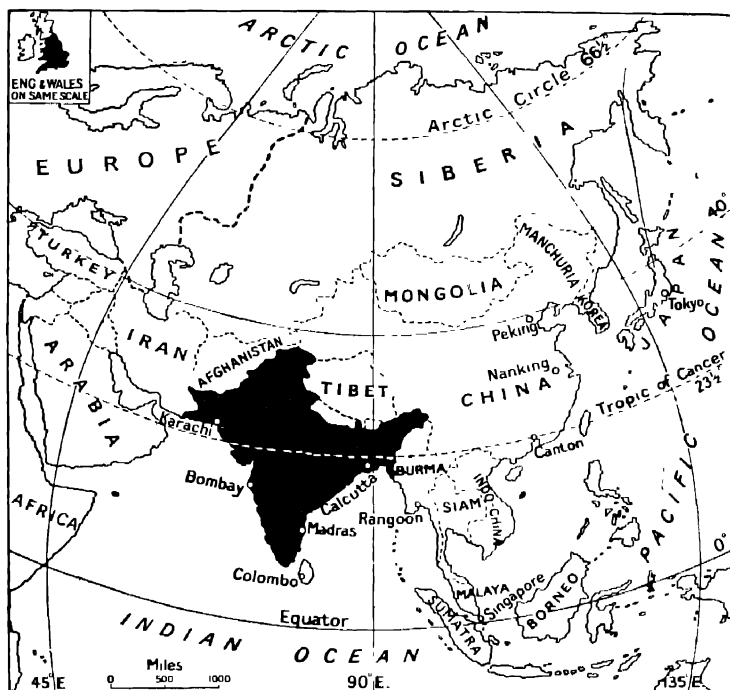


FIG. AS.1.—The position and size of Asia.

Notice very carefully the position of the Tropic of Cancer, the countries through which it passes and the large towns which lie near it. Notice how the Arctic Circle passes right through the north of Asia. Notice also the line of 90° E. longitude passing through the Ganges Delta and through the centre of Asia. On this map measure the distance of the centre of Asia from the sea. India and Pakistan are shown in black.

the greater part of the northern lowlands lies in the basins of the Ob, Yenesei, and Lena. These three great rivers are very long and very slow, for the slope to the Arctic Ocean is very gradual. The rivers flow towards the very cold north, and their lower courses are frozen for many months of the year.

When this happens the water from the upper courses cannot escape to the sea, but spreads over the land and forms great swamps.

The Central Mountainous Triangle. This great area of mountains and highlands forms a triangle in the heart of

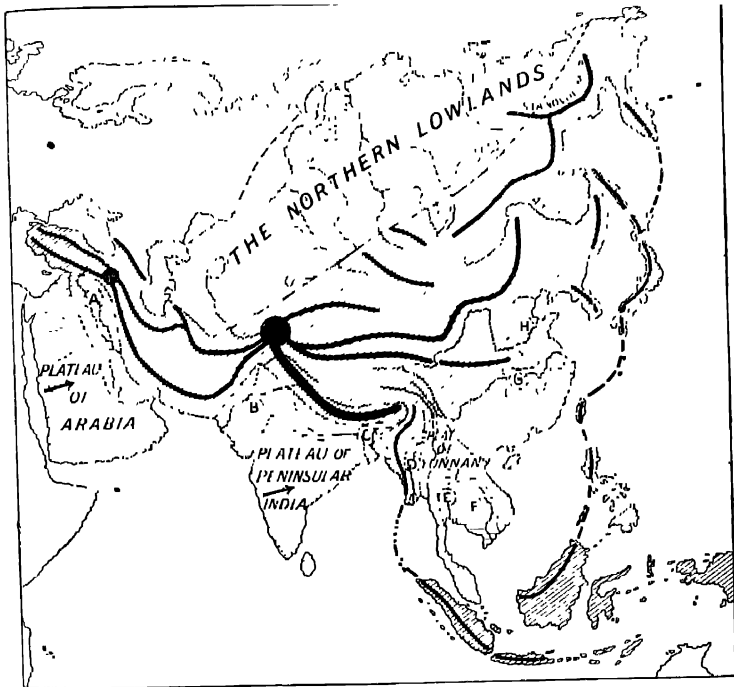


FIG. AS.2.—The main physical features of Asia.

Asia with extensions to the west into Asia Minor and to the south-east. To understand the numerous mountain ranges let us start from the Pamir Knot, a great knot of mountains and very lofty plateaus. (Follow these in Figs. As.2 and As.3.) From this region mountain ranges radiate in nearly all directions. To the west there are two main ranges: one runs south-west as the Sulaiman Mountains, and then along the coast of Iran, continuing as the Zagros system into Asia

Minor, where it forms another knot of mountains—the Armenian Knot—and then turning along the southern coast of Asia Minor as the Taurus Mountains. The other branch runs westwards as the Hindu Kush, along the north of Iran, the shores of the Caspian Sea (Elburz Mountains), and along the northern coast of Asia Minor (Pontic Mountains). Just where this line enters Asia Minor it joins up with the southern line of mountains to form the Armenian Knot. A branch given off by this northern line forms the Caucasus Mountains.

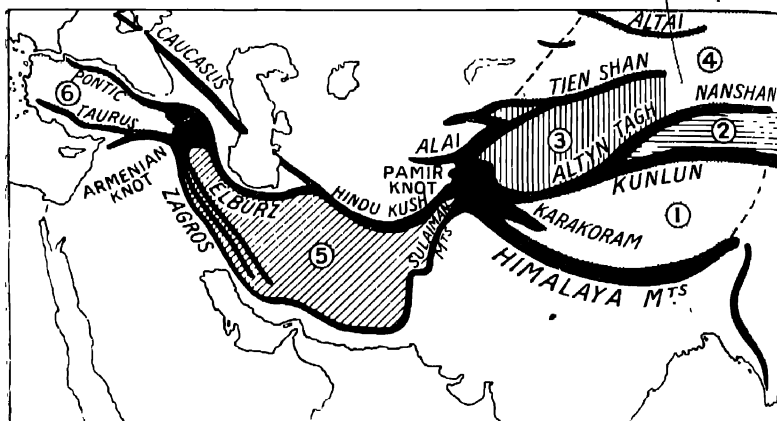


FIG. As.3.—Key to the mountain ranges shown in Fig. As.2

Running eastwards from the Pamir Knot there are four main lines. The most southerly is the greatest range in the world—the Himalayas. Farther north are the two ranges, close together, of the Kunlun and Altyn Mountains, and still farther north are the Tien Shan Mountains running in a north-easterly direction. The last-mentioned line continues right across Asia, forming the boundary with the Northern Lowlands, but it consists of a number of ranges, such as the Altai Mountains and the Yablonoi Mountains, which cross the main line and run from east to west.

There are two other groups of new fold mountains we must consider now.

(a) Running roughly southwards from the eastern end of the Himalayas is a big fold which passes through Burma as the Aikan Yomas, continues through the Andaman and Nicobar Islands to Sumatra and Java, and other islands of the East Indies.

(b) Forming "festoons" or loops down the east coast of Asia are the mountain chains which form the Kurile Islands, the Japanese Islands, etc. On the mainland are other mountain loops such as the Stanovoi and Verkhoyansk ranges.

Between the great lines of fold mountains are the plateaus; many of them are level, surrounded by the ring of mountains and forming areas of inland drainage. They are marked by these numbers on Fig. As.3.

(1) The plateau of Tibet, or the "Roof of the World," is the highest great plateau in the world—more than 14,000 feet above sea-level. It lies between the Himalaya Mountains on the south and the Kunlun on the north.

(2) There is a small basin slightly lower, between the Kunlun and Altyn ranges. It is partly occupied by a swamp.

(3) The Tarim Basin is an important area lying between the Altyn Mountains and the Tien Shan. It is almost rainless and all the streams from the surrounding mountains drain into it to form a small lake and swamp.

(4) The Desert of Gobi, or Shamo, forms an enormous plateau south of the Altai and Yablonoi Mountains and north-east of the Altyn Mountains.

(5) The plateau of Iran, occupying most of Iran or Persia, lies between the northern and southern ranges which run westwards from the Pamir Knot. The ranges join up again as the Armenian Knot.

(6) The plateau of Asia Minor west of the Armenian Knot, between the Black Sea and the Mediterranean.

Most of the great rivers of Asia rise in the central mountainous triangle and break through the bordering ranges on their way to the ocean. Some drain to the Arctic Ocean; others to the Pacific (Amur, Hwang Ho, Yangtse Kiang and Mekong) others to the Indian Ocean (Salween, Brahmaputra, Ganges, and Indus).

The Old Plateaus of the South. There are three great masses built up of hard, old crystalline rocks:

(a) Arabia is a great plateau presenting a steep edge to the Red Sea on the west and sloping gradually to the north-east till it passes into the Tigris Valley. The slope is very gradual and not much broken up, for the country is dry and there are few rivers.

(b) The plateau of Peninsular India slopes on the whole from west to east. The steep western edge we call the Western Ghats, the low eastern edge is the Eastern Ghats. This plateau is much cut up by rivers like the Mahanadi and Godavari.

(c) The plateau of Yunnan and Indo-China stretches from the Shan States in Burma eastwards. A long branch of old rocks runs southwards into the Malay Peninsula. This plateau is also much broken by rivers, such as the Salween, Mekong, and Yangtze.

The Great River Valleys and Plains. These are fertile areas of lowland with vast stretches of alluvial soil. Note their position on the map (Fig. As.2)—the Tigris and Euphrates Basin (A), the Indus Basin (B), the Ganges-Brahmaputra Basin (C), the Irrawaddy Basin (D), the Menam Basin (E), the Mekong Basin (F), the Yangtze Basin (G), and the Hwang Ho Basin (H).

CLIMATE

In the early part of this book we learnt that places a long way from the sea often suffer from great extremes of climate—that is, they are very hot at one season and very cold at another. In the centre of Asia it is possible to get farther from the ocean than in any part of the world so that Asia, more than any other continent, suffers from great extremes of climate. In Asia are to be found some of the coldest lands in the world, as well as some of the hottest.

Conditions in the Cold Season. In the cold season the sun is shining vertically over the Tropic of Capricorn, far to the south of Asia. The centre and north of Asia become extremely cold. There are several reasons why these parts of Asia should

be colder than either Europe or North America. Not only is the heart of Asia very far from the ocean but it consists of an enormous mass of high mountains and plateaus. Since air over mountains becomes very cold there is an enormous mass

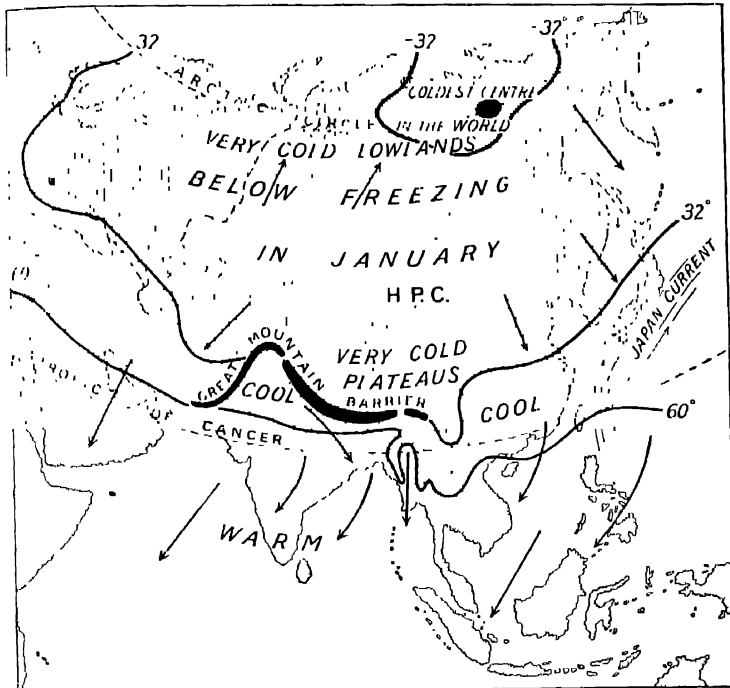


FIG. AS 4.—Conditions in the cold season showing January temperatures and winds.

Notice that the whole of Asia north of the great Himalayan mountain barrier is freezing in January. Notice the cold, dry winds blowing outwards from Central Asia; they make China and Persia cold, but are little felt in India. The warm Japan Current would help to keep Japan comparatively warm but the winds are offshore.

of very cold air all over the centre of Asia. The north of Asia is very cold, because it is not only a long way from where the sun is shining vertically, but it is also cut off from the warm lands of the south by high mountains, and no warm masses of air can reach it.

But cold air is also very heavy, and so we find that in the

Cold Season the whole of Central and Northern Asia is occupied by a mass of cold, heavy air, forming an area of High Pressure. Since it is heavy this air flows outwards from the centre of Asia in all directions on to lower ground, giving rise to cold, dry winds blowing outwards from the heart of the

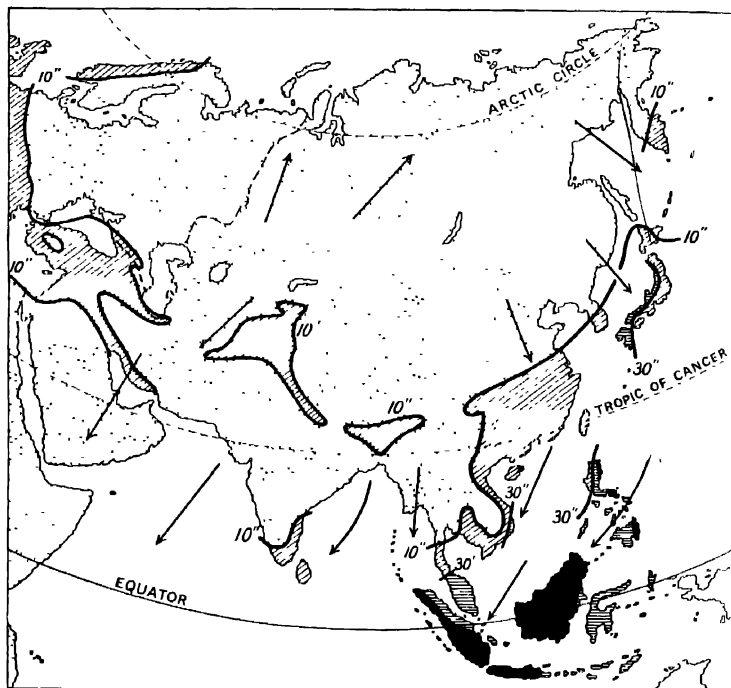


FIG. As.5.—Conditions in the cold season—Rainfall from November 1st to April 30th.

The cold winds bring very little rain except after they have crossed the sea. The rainfall lines marked are 10, 30, and 60 inches. Regions with more than 60 inches shown in black.

continent. The winds are dry because they are land winds; the only places where they become moisture-bearing are where they cross some area of sea. We shall see later that in crossing the sea they bring rain to parts of Japan, south China, Ceylon, and the other countries shown on Fig. As.5. Everywhere else the winds are dry, so that most of Asia receives very little rain

in the cold season except in the East Indies, which lie in the Equatorial Rain Belt. The Himalaya Mountains form a great climatic barrier and protect India, so that it does not feel the very cold winds from Central Asia.

Conditions in the Hot Season, or Northern Summer.—

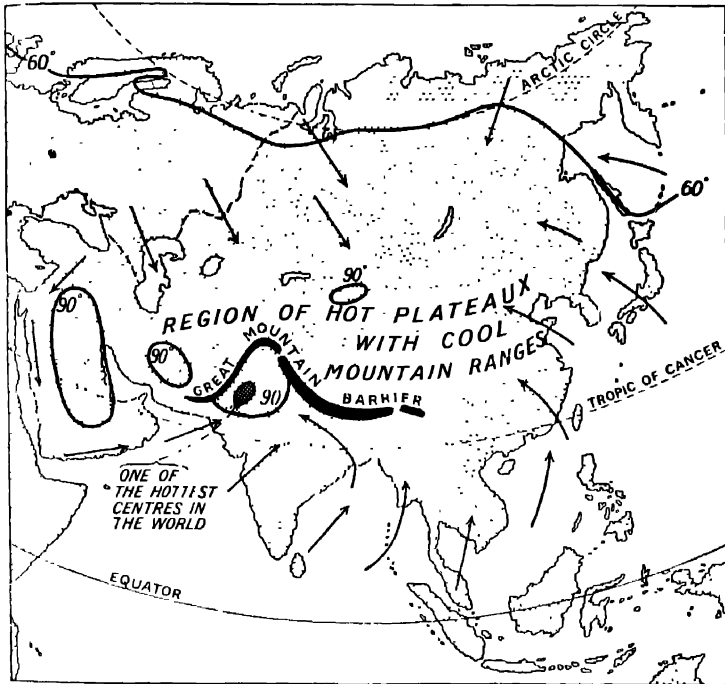


FIG. AS.6.- Conditions in the hot season showing July temperatures and winds.

The sun is shining vertically over the Tropic of Cancer and large areas get very hot. The cool, rain-bearing winds are blowing inwards towards the low pressure centres lying over the hot areas

At that season of the year when the sun is shining vertically to the north of the equator everything is changed. All lands along the line of the Tropic of Cancer become very hot indeed—as happens in India and China in the Hot Season. The hottest part of all is the north-west of India—the plains of the Punjab and Sind. Although it is high above the level of the

sea, even the great plateau of Tibet becomes warm, and the Desert of Gobi is hot. So we find a great area of hot air over Central Asia (Desert of Gobi) and the northern part of India. Hot air is light, and so these are also areas of low pressure

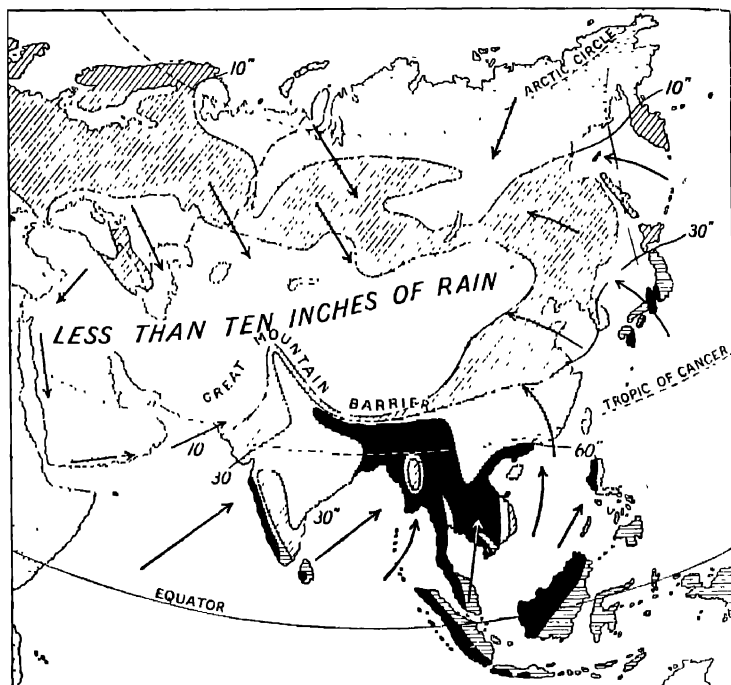


FIG. As.7.—Conditions in the hot season—Rainfall from May 1st to October 31st.

The warm moist winds bring a heavy rainfall to the coasts. All parts marked black have more than 60 inches of rainfall. But the winds lose all their moisture before they reach the hot interior of the continent, which has less than 10 inches of rain in the half year.

the principal centre of low pressure being over north-western India. At this time of the year, then, the cool, rain-laden winds from the ocean flow in towards the centres of low pressure to replace the hot air which rises, and bring rain to nearly all parts of Asia. Look at Fig. As.7 very carefully, and notice the arrows showing the directions of the winds.

The Climates of Asia. The outstanding features of the climates of Asia are these: dry during half the year, when the wind is blowing outwards from the high pressure centre, and wet during the other half of the year when the wind is blowing inwards towards the centres of low pressure. Owing to the great area of Asia there is, however, a great range of climates.

(1) *The Equatorial Climate*, found in the East Indies and Malaya, with heat and rain all the year round.

(2) *The Monsoon Climates*, which are the climates best seen in India, with a Dry Cool Season, a Hot Season when the land is getting heated up, and a Wet Season when the wind is blowing inwards from the sea. This climate is found in India, Indo-China, and part of China. China is colder than India, and the climate may be called "Temperate Monsoon," or "China Type." Japan has a similar, but less extreme, climate with much snow in winter on the north coast. Why is this?

(3) *The Desert Climates of Central Asia*. Although the great deserts of Central Asia—such as the Desert of Gobi or Shamo—are outside the Tropics, their climate is somewhat similar to that of the deserts found within the Tropics, *i.e.* of Arabia, Persia, and India. All the desert regions are characterised by very low rainfall and great extremes of temperature. The great difference between the deserts of Central Asia and those of Arabia is that Central Asia is below freezing point for many months of the year in winter.

(4) *The Mid-Latitude Grassland Climate* occurs to the west, where Asia adjoins the steppe land of Europe and conditions on the fringes of Mongolia are similar.

(5) *The Cold Temperate Climate*, with Coniferous Forests, is found in Siberia.

(6) *The Arctic or Tundra Climate* occurs in the extreme north.

(7) *The Mediterranean Climate* with rain in winter occurs in Asia Minor and Syria.

NATURAL VEGETATION

The natural vegetation of Asia depends on the climate and each type of climate really has its own vegetation.

(1) *Hot Wet Evergreen Forest* is found in the East Indies and wetter parts (more than 80 inches of rain per year) of the Monsoon Lands.

(2) *Monsoon Forest and Scrub*, in which the trees lose their leaves in the dry season, are the characteristic vegetation of

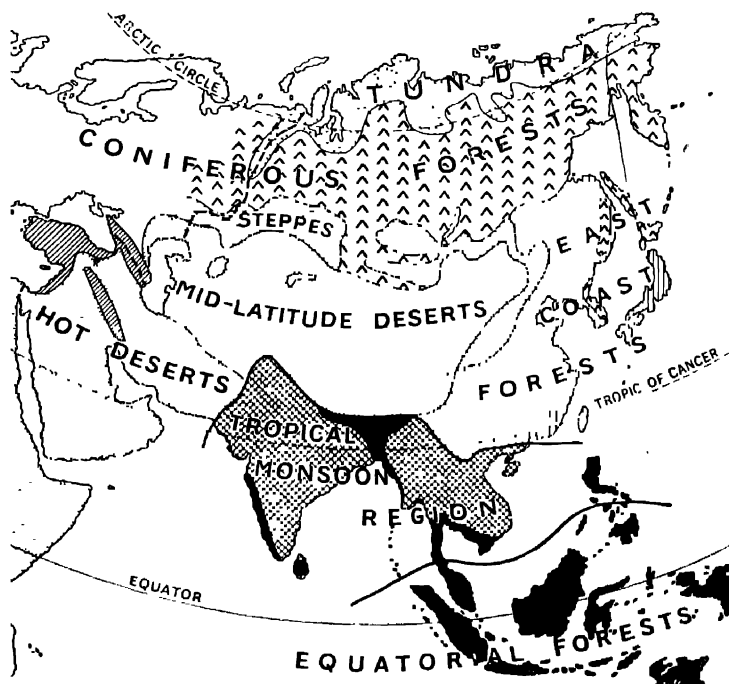


FIG. AS.8.—The natural vegetation and climates of Asia.

Compare this map with what is said about the climates of Asia. In the parts marked "Tropical Monsoon Region" evergreen forests are found in the wettest parts, monsoon forests in the areas with a moderate rainfall; scrubland where the rainfall is poor and desert in the driest parts.

Monsoon Lands. China, with its cooler climate, has forests rather different from those of India.

(3) *The Deserts* are often quite bare, but may have patches of scrub or poor grassland.

(4) *Grasslands (steppes)* are found mainly in the west of Central Asia, connecting with the steppes of Europe.

- (5) *Coniferous Forests* occur as a broad belt in the north.
 (6) *Tundra* is found in the extreme north.
 (7) *Mediterranean Woodland* occurs in Asia Minor and the neighbouring parts of Syria.
 (8) *Alpine or Mountain Vegetation* occurs on the higher mountains and plateaus. Study Fig. As.8 carefully.

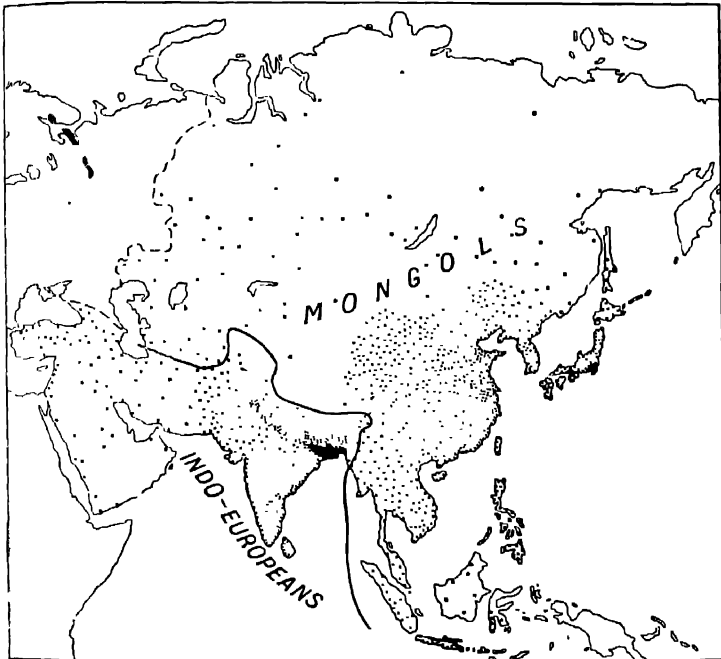


FIG. As.9.—The population of Asia.

Each dot represents half a million people. Notice that the thickly populated countries are India, China, Japan, and Java. This little map is drawn on Gall's Projection and so Asia appears a different shape from what it does on Figs. As.1 to As.8.

POPULATION

Asia, which is the largest continent, has also more people than any other continent. But, curiously enough, most of the people are found in two countries—India and China. Look at fig. As.9 and notice how thickly populated these countries are in comparison with other parts. Indeed one fifth of all

the people in the world are Indians and another fifth are Chinese. There are also large numbers of people in Japan and the East Indies. We have learnt that the Himalayas form a great climatic barrier. They form a great barrier to man also, and divide the two great races of mankind—the yellow-skinned oblique-eyed Mongolians on the one side and the brown-skinned Indo-Europeans (including the Indians) on the other.

Asia is often called the continent of extremes. It has the highest mountains and the highest plateaus as well as the largest stretches of lowland in the world; it has the coldest as well as some of the hottest places, the wettest and some of the driest, the most thickly populated and some of the most thinly peopled lands in the world.

INDIA (INDIA AND PAKISTAN)

India is one of the most fertile and most thickly populated countries in the world; her people are the most advanced of all the peoples living mainly in the Tropics, and boast a history of greatness going back for many thousands of years. But a study of India's history reminds us that it is only during the last hundred years, when India has been under British influence, that the country has progressed towards peace and prosperity. Until 1947 the whole formed the Indian Empire—part of the British Empire. In that year India was given the right to decide its own affairs and two self-governing countries were set up—Pakistan (in two parts, north-western India and eastern Bengal) and India, called also Bharat or Hindustan. Both have a republican form of government but both remain members of the British Commonwealth. The people of Pakistan are mostly Moslems by religion, those of India are Hindu. In the following account we shall consider first the whole area.

The whole is naturally shut in and defended by a great wall of mountains. There are two parts which lie outside the wall. They are the unimportant dry lands of Baluchistan (part of Pakistan) and the cold uninhabited plateau of Northern Kashmir. There are two main areas lying inside the wall which do *not* form part of India or Pakistan—the independent state of Nepal and the island of Ceylon.

Position and Size. The whole lies entirely to the north of the equator. The southernmost point of the mainland, Cape Comorin, is in latitude 8° N. The Tropic of Cancer passes right through India, cutting the country roughly into two halves. Notice the position of this line. Although roughly half of the whole lies outside the Tropics, in the Temperate Zone, we always think of India and Pakistan as tropical countries. We

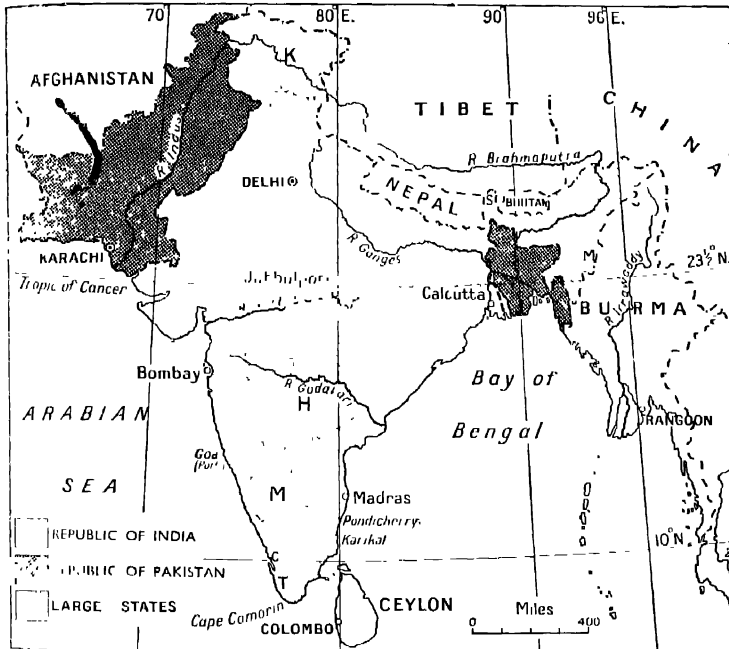


FIG. AS.10.—The position of India Pakistan, and Burma at Partition, 1947.

can do this because they are well marked off from the rest of Asia by the mountain wall, and have a common type of climate throughout. Notice the position of longitude 80° E.—through Jubbulpore and almost along the Madras coast. The area of Pakistan is 365,000 square miles and of India 1,140,000 square miles, which with disputed Kashmir (80,000), makes about 1,500,000 square miles in all. The whole is 2,200 miles from east to west, 2,000 miles from north to south. Notice the

favourable position of India and Pakistan for sea trade—with Europe *via* the Suez Canal; with Africa; with the Far East *via* Singapore; and with Australia. The Republic of India takes its standard time from the meridian of $82^{\circ} 30'$, which is $5\frac{1}{2}$ hours ahead of Greenwich time. West Pakistan is $4\frac{1}{2}$ hours ahead of Greenwich, East Pakistan is 6 hours (see front endpaper).

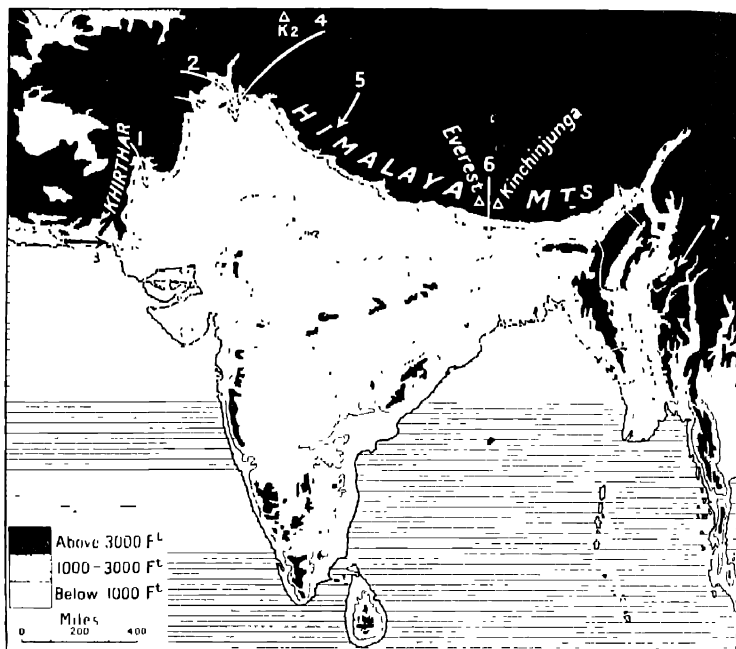


FIG. As.11.—Physical or contour map.

Physical Features. India-Pakistan falls naturally into four main parts:

- (1) A great mountain wall.
- (2) A great lowland plain, the plain of northern India, formerly called the Plain of Hindustan, formed by the valley-plains of three great rivers, the Indus, Ganges, and Brahmaputra.
- (3) A great plateau, the plateau of Peninsular India.
- (4) The coastal plains of east and west.

The Coast-Line. Compared with the size of the country the coast-line of India is short, for there are few bays or gulfs. Places in the heart of India, like Delhi and Nagpur, are thus a long way from the sea. Perhaps this is one reason why the people of India are not, as a whole, a seafaring people. Another result is that India has few good harbours. The west coast of Peninsular India is rocky, and the sea is deep quite close to the coast. There are three inlets which form good natural harbours—Bombay, Goa, and Cochin; but the last of these was for long blocked by sand. The east coast of Peninsular India is less rocky, but the sea along the coast is shallow, so that the great waves break some distance from the shore. The sea is thus too shallow for ships to approach the shore, whilst the surf makes it dangerous to land in small boats. The most important harbour on this coast, Madras, has been built by man. Where the great northern Plain reaches the coast, it is flat and the water is shallow. The only harbours are certain river mouths, such as the River Hooghly on which Calcutta stands.

Ceylon is the only important island lying off the coast of India, to which it is very nearly joined by a line of sand-flats and rocks called Adam's Bridge.

The Mountain Wall. Remember what we have learnt of the mountain systems of Asia and the names which have been given to various parts of India's mountain rampart. From the Pamir Knot in the north the greatest range of all is that of the Himalayas (the "abode of snow"), with many of the highest mountains in the world: Mount Everest, 29,000 feet; Kinchinjunga, 27,815 feet; and many others. Another great range, which is really a northern branch of the Himalayas, runs eastwards from the Pamir Knot, and is known as the Karakoram Range. One of its highest peaks is Mount K₂, or Mount Godwin Austen (28,250 feet). To the north of the Himalayan Range lies the plateau of Tibet, the highest in the world.

Running south-westwards from the Pamir Knot and separating the plains from Afghanistan and Baluchistan, is the Sulaiman Range, passing southwards into the Khirthar Range. The mountain wall between India and Burma has received

which form the five rivers of the Punjab. Farther east is the River Ganges, which flows south-eastwards into the Bay of Bengal. The city of Delhi, the proud capital of India, stands on the River Jumna, a main tributary of the Ganges, but very close to the water-parting between these two river basins. Before the Ganges reaches the sea it is joined by the third of the mighty rivers, the Brahmaputra.

Throughout the whole of the plain of Northern India there is not a hill to be seen. Nearly 1,000 miles from the mouth the surface of the River Ganges is only 500 feet above sea-level.

The Plateau. Nearly the whole of India south of the great northern plain is occupied by a plateau. The western side is the higher, and the surface slopes towards the east. The western edge of the tableland stands up high above the surface of the sea, and is known as the Western Ghats (ghat = "gate"). Notice that the Western Ghats are different from the ranges of mountains in the mountain wall. They are really only the western edge of the plateau. In the same way the lower eastern edge forms the Eastern Ghats. The Eastern Ghats are interrupted by a number of river valleys. The plateau as a whole is also higher in the south—in Mysore—than it is in the north.

The surface of the plateau is by no means smooth. It has been deeply furrowed by river valleys. Then, towards the north an important line of mountains runs across the plateau from west to east. These mountains are the Satpura Range, continued eastwards as the Mahadeo Hills and Maikal Range. This line is a very important one, for the mountains are not easy to cross, and so it cuts off "Northern India" from what is properly called "Peninsular India." Throughout history this line has been an important barrier. There are two other parallel lines—the Vindhya Range to the north and the Ajanta Range to the south—which have helped to make the line more important. Farther to the north-west, overlooking the Thar Desert, is the Aravalli Range.

The Coastal Plains. Between the Western Ghats and the sea there is a narrow coastal strip; between the Eastern Ghats and the sea there is a coastal plain of varying width.

Doors through the Mountain Wall. There are no easy through the mountain rampart which surrounds India and Pakistan, but there are some difficult passes by which people from outside can approach India. In bygone ages India has been invaded from the north-west. The two more important doors by which the invaders came were the Bolan Pass (1) and the Khyber Pass (2), marked on Fig. As.11. These doors are still important. The routes from Tibet (4, 5, 6) and across the mountains of Burma are all difficult. Nearly every one goes to Burma by sea—from Calcutta or Madras to Rangoon.

The Rivers of Northern India. The great rivers of the Indo-Gangetic plain all rise in the mountain wall or beyond it. The rivers are fed with water from the gradual melting of the snow, which lies on the mountains. These rivers do not depend for their water entirely on the monsoon rains; they depend on the snow and rain which fall on the mountains at other times of the year. These rivers are never dry; they always have some water in them.

In the mountains these rivers are roaring, rushing torrents, pouring through gorges or narrow valleys, over waterfalls, and among great boulders. When they reach the great northern plain, they become slow, broad rivers wandering lazily across the plain. So flat is the valley that often the rivers desert their beds and make new courses.

The three great river systems of the north are:

(1) The Indus River, with its tributaries the Jhelum, Chenab, Ravi, Bias, and Sutlej (the five rivers of the Punjab).

(2) The Ganga or Ganges River, of which the main tributary is the Jumna or Jamuna.

(3) The Brahmaputra River, which has no important tributaries.

* *The Rivers of Peninsular India.* The rivers of Peninsular India are different from the rivers of Northern India; they rise on the plateau, and they are fed only by the monsoon rains. In the Dry Season they become almost dry—so nearly dry that only the smallest boats can use them. Owing to the general slope of the plateau, the rivers rise near the Western Ghats and flow towards the Bay of Bengal. The most

Important rivers are the Mahanadi, Godavari, Kistna or Krishna, and Cauvery.

Further north between the ranges are the Narbada and the Tapi, both flowing westwards.

The rivers of Northern India are usually more important than those of Peninsular India.

(a) They yield a constant supply of water which can be used for irrigation.

(b) They traverse, in their lower courses, broad, flat plains of fertile alluvium, very suitable for irrigation.

(c) They afford good highways of communication, though they are much less used than formerly.

On the other hand, the rivers of Peninsular India—

(a) Do not yield a constant supply of water.

(b) Have valleys that are less suitable for irrigation.

(c) Are not navigable for long periods of the year.

Notice also that the rivers of Northern India have a long upper course in the mountains; the rivers of Peninsular India have not.

Geology and Minerals. The main features of the geology of India correspond very closely with the physical features. The mountain walls consist mainly of folded sedimentary rock. The great plain consists almost entirely of alluvium, and so do most of the coastal strips, and, of course, the river delta. In the Ganges Valley the alluvium is many hundreds

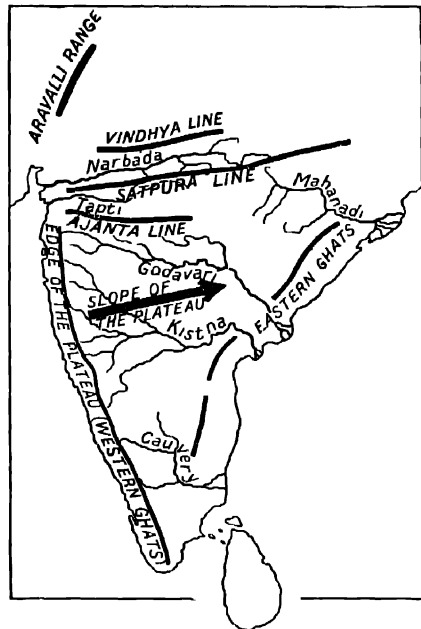


FIG. As.13.—The rivers of Peninsular India.

of feet thick. In the Upper Ganges Valley and the Punjab there are hard pieces in the soft alluvium called "kankar." The Plateau consists mainly of very old crystalline rocks. This mass of old rocks was in existence long before the great Himalayan fold mountains were formed; it has for long ages formed a "solid block" of much-altered and folded rocks. Near the edge of the plateau are areas of sedimentary rocks, important because they are coal-bearing. Nine-tenths of the coal of India comes from the Jharia and Raniganj fields in the north-eastern part of the plateau. Nearly the whole of the north-west of the plateau has been covered by great sheets of lava—the Deccan lavas. This region is one of the largest areas of lava in the world.

Many valuable minerals occur associated with the old crystalline rocks. Gold is obtained especially from the Kolar Goldfield. Manganese comes mainly from the heart of the plateau. Copper and iron are found in other parts of the plateau, especially in the north-east. Mica is mined.

Mineral oil, or petroleum, is found in young soft rocks, usually on the borders of great fold ranges. There are no very large oilfields, though there is some oil in the Punjab (Pakistan) and Assam (Indian Republic) and also natural gas.

Climate. In the tropical monsoon climate of India there are really three seasons.

- (a) The Cool Season, from about the middle of October to the end of February, when the temperature is comparatively low, and there is little or no rain.
- (b) The Hot Season, from March to June, when the sun is shining vertically over India and the land gets very hot.
- (c) The Rainy Season, from about the middle of June to the middle of October, when the South-West Monsoon is blowing and bringing the rain. It is cooler, because the clouds protect the land from the sun and the rain cools the air.

The Cool Season. During this season the sun is shining vertically far to the south of India, and, as we should expect, the coldest regions are in the north of the country and in the mountains. In the northern plains it is sometimes just cold

enough for frost to occur at night, because those places which are a long way from the sea have hot days but cold nights. Lahore has a daily range of 32° , but places on the sea-coast in the south only about 8° . During this season the winds blow outwards (see Fig. As.14) and are the North-East Trade winds or North-East Monsoon. They are dry, except where they have crossed the sea. (Where will this be?)

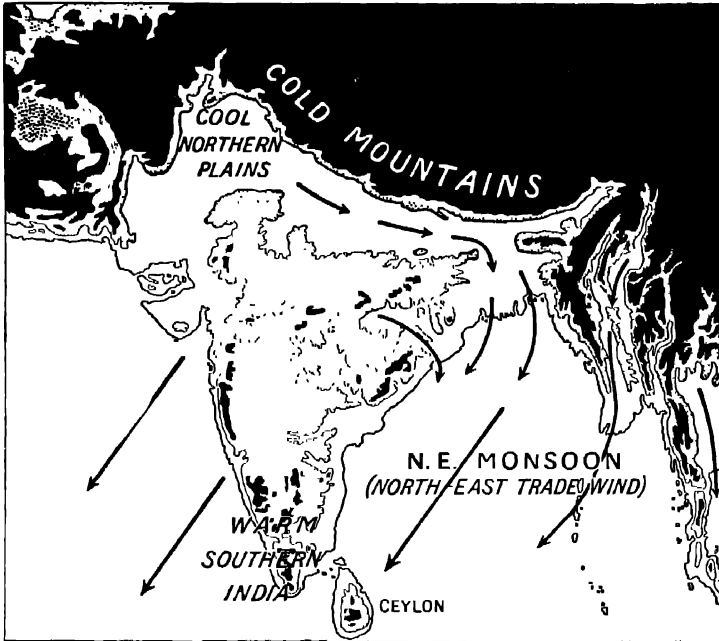


FIG. As.14.—Cool Season conditions in India.

The Hot Season. As the belt where the sun is shining vertically at noon moves northwards, the temperature in India rises. The land mass gets hotter and hotter: in March, April and May in the south, a little later in the north. It is too hot to work by day and so the schools have their long vacation at this time—not, as most of us, in August and September. It becomes so hot that at last the mass of heated air begins to rise, and cooler moisture-laden winds from the ocean flow in to take

its place. This current of air is the South-West Monsoon (see Fig. As.15).

The *Rainy Season* commences or, as they say, the "rains break" at slightly different times in different parts of India, but June 15th is a normal time in many places. Thunderstorms usually occur just about the beginning and end of the rains, when the atmosphere is very disturbed. Notice that the South-

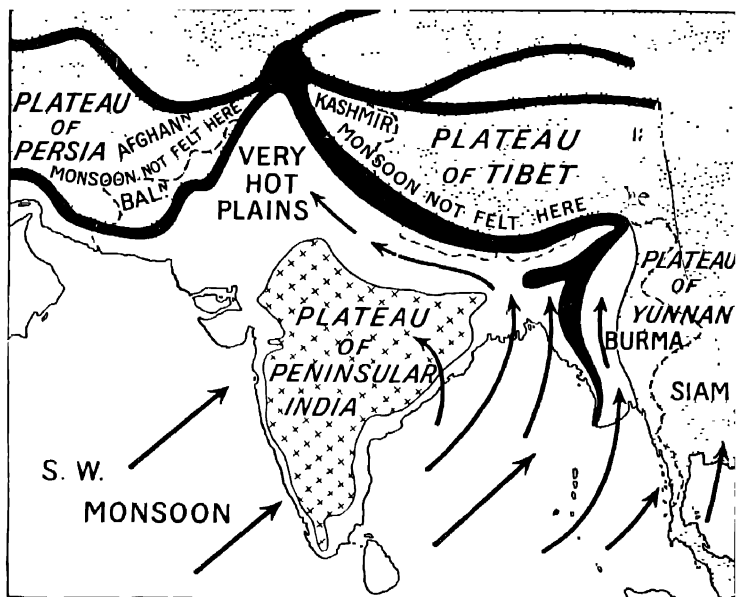


FIG. As.15.—Conditions during the Rainy Season.

West Monsoon does not everywhere blow from the south-west. The actual direction is controlled by the lines of mountains and valleys. The same is true of the North-East Monsoon.

Rainfall. India receives most of its rain from the South-West Monsoon, and hence the rain falls from June to October. Fig. As.16 is a simple rainfall map of India for the year. Notice that it has marked on it only three rainfall lines, which divide India into four parts:

- (a) Good Rainfall Division, with more than 80 inches in the

year. In the plains rice is everywhere the most important crop, and the hills are covered with thick evergreen forest or jungle. Sometimes the rainfall is excessive.

(b) Moderate Rainfall Division, with between 40 and 80 inches of rain in the year. In the hills fine forests of valuable

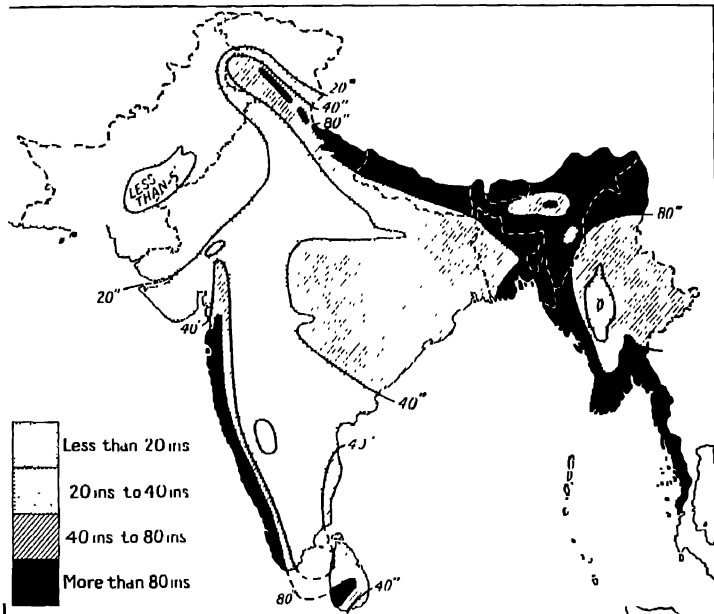


FIG. As.16.—Rainfall map of India for the year.

In the centre of Peninsular India a small patch has been left blank. How should it be shaded, and why? This map shows clearly a "rain-shadow" area behind the Western Ghats and shows how the heaviest rainfalls occur where winds meet hills at right-angles (compare Fig. As.15). Two of the wettest places in the world are near Bombay and at Cherrapunji in the Khasi Hills of Assam

sal and other trees flourish with this rainfall. In the plains many crops can be grown without irrigation, and there is a mixture of dry-zone and wet-zone crops.

(c) Poor Rainfall Division, with between 20 and 40 inches of rain. Here the dry-zone crops such as millet grow; wet-zone crops such as rice can only be grown with the help of

irrigation. The hills are largely covered with scrub, because it is not wet enough for forests to grow properly.

(d) Desert and Semi-Desert, with less than 20 inches of rain. It is almost impossible to grow any crops at all without irrigation.

These rainfall divisions of India are so important that we should try to carry a picture of Fig. As.16 in our minds.

In most parts of India the rains cease in September or October, but the Madras coast in Southern India and the island of Ceylon get a considerable amount of rain in October,

November, and December. This is shown clearly in Fig. As.17.

Baluchistan and Northern Kashmir are both outside the Monsoon region. They are both very dry, but receive some rain or snow mainly in the colder months.

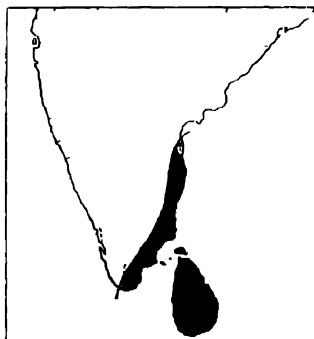


FIG. As.17.—Cold Season rains in Southern India and Ceylon.

Map showing the part of Peninsular India which has not less than 10 inches of rain in November and December.

Natural Vegetation. India is a thickly populated country, and over large areas the natural vegetation has been almost entirely removed by man. There is, for example, practically none left in the Ganges Plain. But in the hilly regions, and in the less thickly peopled parts, much of

the natural jungle remains. The following are the principal kinds of natural vegetation in India:

(a) *Evergreen Forest.*—When the rainfall is more than 80 inches in a year (see Fig. As.16) we find forests in which the trees are green all the year round. There are many different kinds of trees in these forests; often they are of very large size. But the wood of the trees is very hard, and has not been much used commercially. The lowlands have been cleared to make rice-fields, but the forest, the natural vegetation, remains on the hills.

(b) *Monsoon Forest.* Where the rainfall is more than 40 inches, but less than 80 inches, the forest gets very dry in the

Hot Season. The trees lose their leaves to protect themselves against the heat of the sun, and so the forest is leafless for part of the year. These "Monsoon Forests" are very valuable, for in them grow the most important trees of India. The two most useful trees are the teak of the western part of the plateau, and the sal, which grows along the lower slopes of the Himalayas and in the north-east of the plateau. The Monsoon Forests are so valuable that they are largely "reserved" by the Government to prevent them from being destroyed by careless and wasteful use.

(c) *Scrub Forest and Scrubland.* Where the rainfall is less than 40 inches in a year it is too dry for forests to grow properly. A few trees grow, but most of them are armed with spines, or thorns to prevent their being eaten by animals.

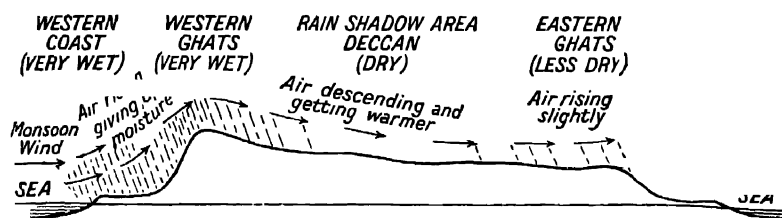


FIG. AS.18.—Section across the Deccan Plateau.

Forests of small, thorny trees are called "Thorn Forests." Sometimes the trees are so small that they are really only bushes, and are often far apart (scrubland). Scrubland covers large areas in the drier parts of India. Early in the rainy season much of the land becomes covered with grass but it dries up quickly when the rains are over.

(d) *Desert and Semi-Desert.* As the climate gets drier and drier, so the thorny trees and bushes become fewer. Instead we find plants which have very long roots, and which store up water in their fleshy stems and leaves.

(e) *Grassland.* There is not much true grassland in India. Patches occur in hilly regions, interrupting the Monsoon Forests.

(f) *Mountain Forests.* On the hills and mountains of Southern India above 5,000 feet, and on the Himalayas above

3,000 feet as also in Burma, we find the forests are more like those found in Temperate lands. The trees are evergreen: some of them are broad-leaved trees like the oak, others are conifers. These forests are especially important on the Himalayas.

(g) *Alpine Vegetation.* On the highest parts of the mountains it is too cold for trees to grow. There are bushes including rhododendrons and short grass; where it is dry, practically nothing grows at all. On the very highest parts of the mountains of Northern India (above 18,000 feet) there is always snow.

(h) *Mangrove Forests.* There are certain trees which must have their roots covered by salt water at every high tide. The mangroves are the most important. We find them growing along the sea-coast where it is flat and muddy, and in the Ganges Delta the mangrove forests or swamps are called the "Sundarbans" after *sundri* the Bengali name for mangrove.

Useful Forest Products. The teak and sal give good timbers. The pine trees of the mountains yield fine soft-wood timber and resin, but the forests are difficult to reach. Many of the poorer kinds of wood in all parts of India are used for firewood. The mangrove forests are found in deltas where no other wood is available, and are therefore valuable for fuel. Bamboo is really a very large grass and grows in many parts of India, but especially in the Monsoon Forests. It is used for very many purposes. Another forest product is lac, a sticky substance produced by insects living in the forest trees and used for making varnish, etc.

The method of working the timber of the forests is interesting. It is cut in the dry season and dragged to the small streams by elephants or buffaloes. When the rains come the streams rise, and the logs are floated down to the bigger rivers. These logs are joined together to form rafts and floated down the rivers to saw-mills, where the wood is cut up into planks.

Agriculture. India is essentially an agricultural country. Four-fifths of the vast population depend on agricultural pursuits for their existence. With a huge population of 480,000,000, there is naturally very little surplus of food grains

available for export. The following are some of the principal crops of India:

Rice is grown mainly on flat, alluvial land where there is an abundant rainfall. Its distribution is shown in Fig. As.19. This should be compared with the rainfall and physical maps. Rice is the staple food of the people in the wetter

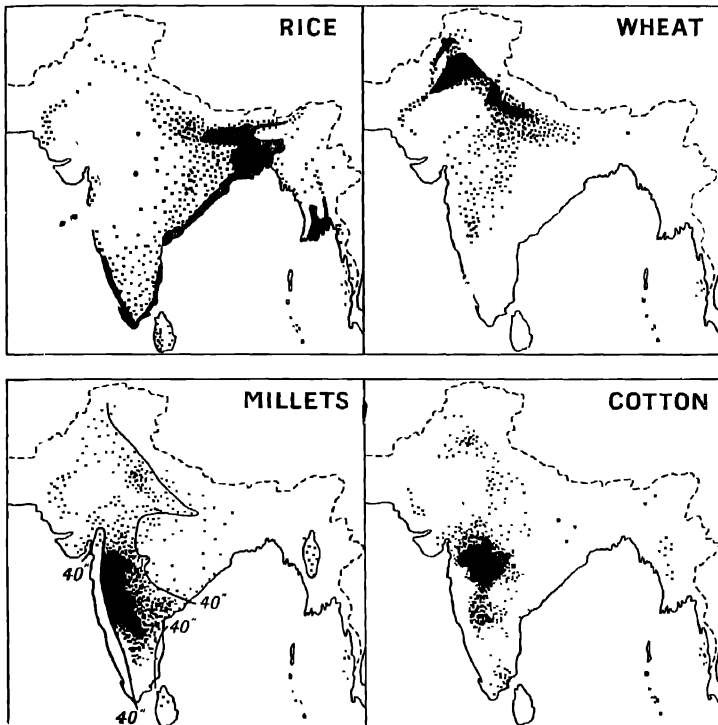


FIG. As.19.—The distribution of some leading Indian crops.

regions of India. In the drier regions it becomes less important, and where the rainfall is less than 40 inches it can only be grown on irrigated land.

Wheat, which forms the principal food grain of most white peoples, has become the favourite food in the drier parts of Northern India. It is there a winter crop, so that the land

can often be used for other purposes during the rest of the year. It is sown at the end of the rains, and ripens about December before the great heat commences. Some used to be exported to Europe but now there is an import especially from Australia. Unlike rice, wheat requires only a moderate amount of water and would be killed if the young plants were covered by water as rice is. Wheat is a very important crop in the Punjab and many of the northern parts of India where the rainfall is less than 40 inches. As we travel down the Ganges Valley into wetter regions or southwards into hotter regions it gradually disappears. This can be seen from Fig. As.19.

Barley. Barley is another important crop which grows largely in the same districts as wheat, but on lighter soils.

Millet forms the staple food of the people in most of the drier parts of India. There are several different kinds, the three principal being *cholum* or *jowar*, *cumbu* or *bajra*, and *ragi* or *marua*. Where the rainfall is less than 40 inches millet is everywhere important, and it can be grown without irrigation even when the rainfall is as low as 20 inches. When the rainfall exceeds 40 inches it quickly disappears.

Corn or *Maize* is grown both for its grain and as green fodder for cattle. In India it flourishes both on the plains and in the hills where the rainfall is moderate. We find it with millet in dry regions, but also in damper regions. But in the Lower Ganges Valley with a rainfall of 60 inches it disappears.

Pulses of many different kinds are cultivated throughout the country. The most important is gram, which affords a good food as well as fodder for cattle and horses.

Sugar-cane is grown in nearly all parts of India and Pakistan, but most comes from the irrigated lands of the Upper Ganges Valley and the Punjab. In recent years much more has been grown and many sugar mills built, so that India now makes all the sugar she requires.

Cotton is the most important of the crops not grown for food. There are two principal kinds:

- (a) Native Indian cotton, usually with short hairs, or, as we say, a "short-stapled" cotton.

- (b) American cotton, of which the plants were originally brought from America, which has much longer hairs and is much more valuable.

Cotton is a dry-region crop, and flourishes where the rainfall is less than 40 inches. The soil is important; one of the best is the sticky black cotton soil produced by the weathering of the Deccan lavas. The American cottons require more moisture and have to be grown on irrigated and carefully prepared soil, as in the Punjab. Fig. As.19 shows the distribution of cotton.

Jute is a crop which is different from almost all others in that it is grown in enormous quantities in one part of the world only, and that is in the very wet lands of the Ganges Delta. The stems yield a very strong fibre from which most of the sacks in the world are made. Like rice, it is a plant of the low, wet lands.

Oilseeds. Plants grown for the sake of the oil obtained from their seeds include linseed, rape, mustard, sesamum (sesame), and ground-nuts. They grow best with a medium or low rainfall, and some prefer slightly hilly country. Ground-nuts or pea-nuts grow on very dry sandy lands. A proportion of the crop is grown for export.

Coconuts are also grown largely for the sake of the oil obtained from their nuts. The dried kernel of the nut, known as copra, is a valuable product and is exported. Coconut oil, which is pressed out of copra, is the basis of soap and margarine. A useful fibre, called coir, much used for making matting, is obtained from the outer shell of the nuts. Coconuts grow best in wet regions along the coast and are grown down the west coast (also in Ceylon), in the Nicobar and other islands of the Indian Ocean, and on parts of the east coast.

Tea. The tea-plant is a shrub which requires a good rainfall, but must be grown on hill slopes or where the water does not remain near the roots. Most of the tea is grown for export. The hill slopes bordering the Brahmaputra Valley in Assam, the Himalayan slopes near Darjeeling and Dehra Dun, and the slopes of the Nilgiri Hills are the chief centres. Tea is obtained from the dried leaves of the shrub.

Coffee was once important in Mysore, but a bad disease killed many of the plants, and other countries in the world, such as Brazil, can grow coffee more cheaply than India.

Tobacco. Soil is often more important than rainfall for tobacco, and a little is grown in most districts of India.

Rubber. The rubber tree is a native of equatorial regions, so the rubber plantations of India are found only in the extreme south—in Travancore—which is nearest the equator.

Indigo is a small plant from which a purple dye is made. It used to be important in the Ganges Valley, but it is now possible to make chemical dyes more cheaply, and the growing of indigo is not nearly as important as it was.

Opium is obtained from the seed-capsules of the opium poppy. It is smoked by the Chinese in small pipes instead of tobacco, and large quantities used to be sold to China. But it is a harmful drug and the Government agreed not to sell any more except for medicine, and very little is now grown.

The Animals of India. Famous wild animals of India such as the tiger, elephant, and wild buffalo are only found in the remoter parts. Elephants are caught by being driven into a very strong and narrow enclosure called a *keddah*. The elephant cannot turn round in the narrow *keddah*, and charges the end until tired out, and is then chained to a tame elephant for training. The elephant is a very intelligent animal, and at the same time is very strong and is most useful in the forests and can be taught to drag great logs of wood, or pick them up and carry and arrange them in neat piles. He is also used as a beast of burden, and can travel through thick jungle where there are no roads for bullock-carts.

Oxen. Oxen are probably the most useful animals in India. There are enormous numbers of them, because they are used for ploughing and for drawing carts all over India. There is roughly one bull or bullock or cow for every two people. The people in India do not use much milk, and the bullocks are valued more than the cows. However, in some parts of India, e.g. in Uttar Pradesh (United Provinces), good fodder is grown and there is dairy farming. In many of the drier parts of

India there is not sufficient grass to feed the oxen, so fodder has to be grown for them.

Buffaloes. There are some 50,000,000 buffaloes in India. The buffalo is heavier and stronger than the ox, but slower. Although the buffalo is very fond of the water and is much used in rice-fields for ploughing, we also find large numbers in the drier parts of India, as in Uttar Pradesh.

Sheep. There are many million sheep in India, mainly on the dry hilly parts, where they can live on grassland or wasteland which is not good enough for cattle. They are most abundant in Madras. Compared with the sheep of Australia and New Zealand, those of India are very poor. They do not give very good wool or meat.

Goats. Goats are to be found everywhere in India, for they are very easy to keep. They can

live on the poorest of grass or shrubs, and find enough to eat even in the driest parts.

Horses and Ponies. There are less than two million horses and ponies in India, because horses are not used for ploughing, but mainly for drawing small carts in the towns.

Mules and Donkeys. Mules are valuable pack-animals in hilly regions, as they are very sure-footed. Donkeys are used in the same way in the drier parts of India and can travel long distances across dry, sandy country.

Camels. The "ship of the desert," is found in dry parts, but

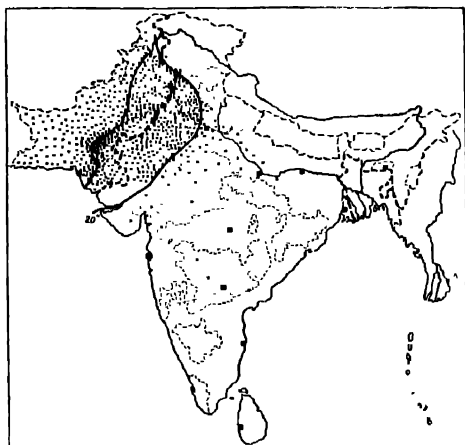


FIG. AS.20.—The distribution of camels in India and Pakistan.

Each dot represents 1,000 camels. The line marked is the 20-inch rainfall line. Notice how nearly all the camels live where the rainfall is less than 20 inches a year.

not at all in the wet regions—an excellent example of “climatic control” in relation to animals (see Fig. As.20).

Population. In the whole of India, there are over 480,000,000 (four hundred and fifty million) people. At the Census taken in 1951 there were 357,000,000 in the Republic of India, 76,000,000 in Pakistan and nearly 5,000,000 in Kashmir. The total is increasing at the rate of 6,000,000 a year. Now these are

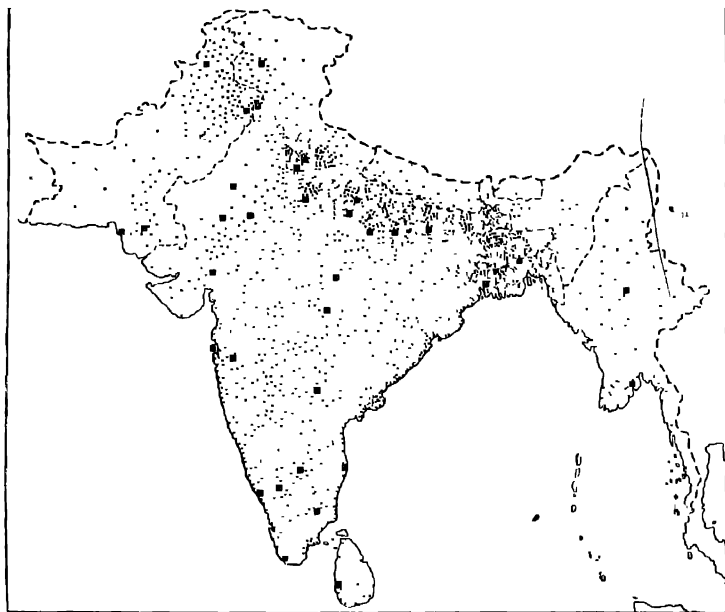


FIG. As.21.—The population of India, Pakistan and Burma.

Each dot represents 100,000 people. Each square dot represents a town with more than 100,000 people.

very large numbers—so large it is very difficult for us to realise what they mean. Suppose we had to make one stroke like this **!** to represent each person in India, and we started now, making the strokes as quickly as we could, and went on and on, day after day and week after week, only stopping for food and sleep, it would take us over six years to make 480,000,000 strokes.

These people are not scattered equally all over India. Some parts of the country are thinly populated, other parts are thickly populated. Fig. As.21 is a population map of India on

which each dot represents 100,000 people. By comparing this map with the physical, vegetation, and rainfall maps we find that the population is densest—

- (1) in the lowlands or slightly hilly regions;
- (2) on the tracts of alluvium.
- (3) both in dry (but irrigated) and wet districts;
- (4) where the natural vegetation has been removed and cultivated land is found.

Urban and Rural Population. Although India has ten times as many people as England there are fewer large towns. The population is mainly rural; India is an agricultural country—the population is densest where agriculture is most important. This is quite different from what we find in Britain or North America.

The Races of People in India. Ages ago the only people living in India were uncivilised jungle tribes. Then India was invaded by cleverer people who spread all over India and drove the wild inhabitants away to the hills and thick forests. Later came wave after wave of invaders from the north-west who took possession of all the best lands, such as the fertile plain of the north, and drove the earlier inhabitants into Peninsular India, south of the Satpura line. The Satpura range of mountains formed one of the great barriers hindering the spread of the invaders to the south. There are greater differences to be found amongst the people of India, both in physical characteristics and language, than amongst the races of Europe. But the races have become mixed, and it is much easier to classify the peoples according to the language they speak, or according to their religion.

The Languages of India. The large number of languages spoken in India is thus a result of the history of the country. When so many different languages are spoken in a country, it is very difficult for people when travelling about to understand one another. In order that people may understand one another there are a number of “common languages,” or *lingua franca*, which are spoken or understood by people, although not their own language. The most important of all is English, which is spoken or understood over more than half the world.

It is understood by educated people throughout India. Otherwise Hindustani is understood by a large proportion of the people in northern India as Tamil is by a large proportion in the south.

Religion. More important than race or even language, there is religion. In India the lives of the people are very largely controlled by religion. It determines their upbringing, education, customs and habits, marriage, occupation, dwelling-place, type of home, and the architecture of their towns. Here are just a few examples of the varying influence of religion. To the Hindus the cow is a sacred animal and they will not eat beef; to the Mahommedans the pig is an unclean animal and they will not eat pork. It is forbidden for a Buddhist to take life, and he will not kill an animal for food. Early marriage is the custom amongst certain Hindus, and nearly all the girls are married before they are ten years old in certain parts of India.

Amongst the Hindus is found the "caste" system. The higher castes have many privileges, but if a man is born in one of the lower castes he may be compelled to do menial work all his life (such as sweeping up rubbish). In some parts of India the "purdah" system is observed, and in Bengal the people do not live in villages but in isolated huts, so that the women shall not see a man (except their husband) or even other women. But great changes are taking place and many of the old customs are disappearing.

We find in India that there are "religious centres"—famous places of pilgrimage or seats of learning connected with one of the religions. Thus Benares with its thousands of Hindu temples and its Hindu colleges is a centre of both the Hindu religion and the culture connected with it. Lahore is a great centre of Mahommedanism, Amritsar is the centre of the small but important group the Sikhs. To the Hindus the River Ganges is the most sacred river in the world; to die or to be cremated on its banks is to gain everlasting peace. Hardwar, where the Ganges leaves the mountains, is one of the most sacred places of pilgrimage.

The two greatest religions of all—Hinduism, which may be

called the natural religion of India, and Mahommedanism—are widely distributed. Wherever Mahommedans are found, their mosques with the characteristic form of architecture are found also. Mahommedanism came to India with the later invaders from the north-west, and so we find it predominates in the north-west; but there is another strong area in Bengal. These are the parts which now form Pakistan. Hinduism predominates in other parts of India in what is now the Indian Republic. Christianity was brought by sea-faring peoples, and is strongest near the coasts.

Occupations. India is mainly an agricultural country. Fig. As.22 shows the relative importance of occupations other than agriculture. Although India has always been an agricultural country, it has also been noted for the cleverness and skill of its people in making cloth and silk, working in metal

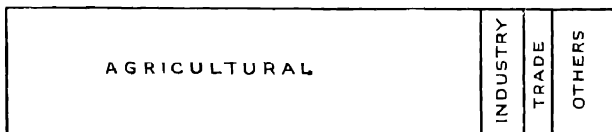


FIG. As.22 — Occupations in India

and ivory and wood. But machine-made articles can be produced so much more cheaply than hand-made articles, and India is fast taking her place in the world as a manufacturing country as well as an agricultural country. We can still distinguish:

- (a) The old native industries of hand-made articles.
- (b) The newer factory industries of machine-made articles.

Manufactures of India. (a) *Cotton Goods.* The most important native industry has always been the weaving of cotton fabrics. Cotton is one of the native plants of India, and though enormous quantities are produced for export, over half is used in the country. In some parts of India every house has its hand-loom where the women make *saris* for themselves or *dhotis* for their husbands. More important now are the great cotton factories. The most important cotton manufacturing centre is Bombay, where a quarter of a million people are

employed in the cotton mills. There are also mills in Madras, Uttar Pradesh (as at Kanpur, formerly Cawnpore), and Madhya Pradesh (the Central Provinces).

(b) *Jute*. Formerly most of the jute mills were up the River Hooghly north of Calcutta but the jute was grown farther east in what is now East Pakistan. Now the Republic of India is trying to grow more jute for her factories and Pakistan to build factories but much jute is exported raw.

(c) *Silk*. India has long been famous for its beautiful silks, and many of the old towns are still noted for special kinds. But the industry is very small when compared with cotton or jute. Much of the raw silk is imported, but some native Indian silk is also produced. Bengal is the chief silk-producing area.

(d) *Woollen Goods*. India has also long been celebrated for woollen goods, including carpets and shawls. The weaving of shawls is a typical industry of Kashmir. Carpet-making is carried on in many parts of India, and coarse blankets are made in Northern India, where the winters are cold.

In the cotton, silk, and woollen industries native vegetable dyes such as indigo were formerly used, but now cheap chemical dyes are imported.

(e) *Metal-working*. Iron-working is another old industry of India, but the great Tata iron and steel works, on the north-eastern coalfield, are an example of large modern iron-works. Many castes in India use brass for all cooking utensils, and brass-working is an important industry in many towns of Northern India, such as Banaras (Benares). Indians are fond of jewellery, and many towns have goldsmiths and silversmiths. In recent years there have been many developments.

(f) *Pottery*. The making of pottery for domestic purposes is a native or "cottage" industry all over India.

(g) *Other Manufactures*. There are numerous wheat-flour mills in the Punjab; saw-mills in Assam; oil refineries in Assam and the Punjab, and tobacco factories in Madras and elsewhere. Sugar-mills in various parts have recently become important. In Southern India the rubber industry is important, and tea-packing in Assam. Some towns such as Lahore have large

railway workshops. During the Second World War many other kinds of industries were developed.

Irrigation. By far the most important type of irrigation is by means of canals which have water in them all the year round.

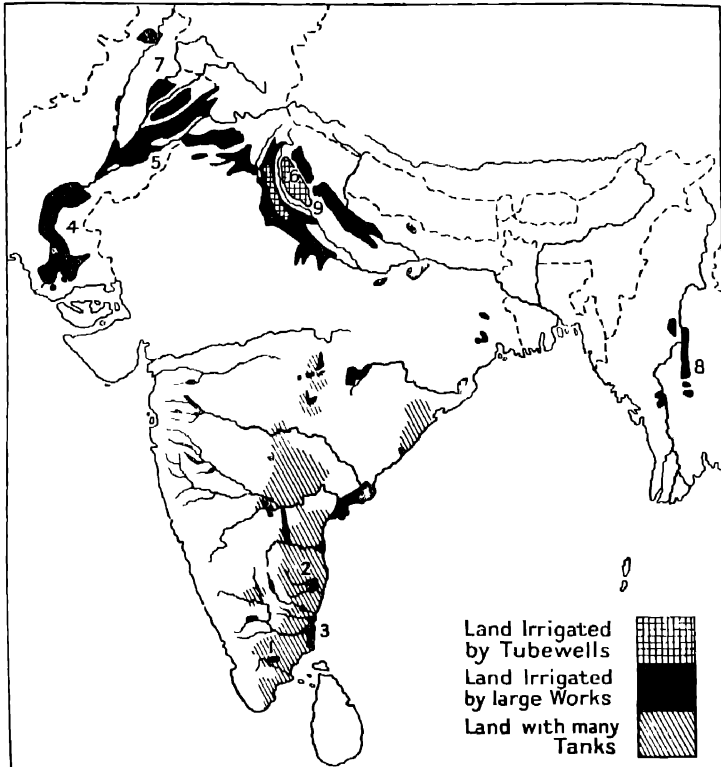


FIG. AS.23 —Irrigation in India.

1, 2, 3=Madras, 4=Sind, 5—the Punjab, 6—Uttar Pradesh; 7—Peshawar Area;
8=Dry Zone of Burma. 9—Uttar Pradesh

Many of the canals are hundreds of miles long, and the construction of them costs enormous sums of money. The British Indian Government spent the tremendous sum of £100,000,000 on irrigation works in India, and 50,000,000 acres have been made fertile for the poor farmers. Since independence in 1947

many new works have been undertaken both in India and Pakistan, especially in the great northern plain. Although the rainfall in these parts is poor, there is a good rainfall, as well as a heavy snowfall, in the Himalaya Mountains to the north, so that the rivers which rise in those mountains are never dry. Nearly all the large rivers have been "tapped" just where they leave the mountains. A dam or weir is built across the river, so that the water can collect to form a lake. In the Indian rainy season more water may flow into this lake than is required, and it is allowed to escape over the wall. But in the dry season nearly all the water in the lake will be led into the canals. A very large and famous dam is at Sukkur, on the River Indus. Completed in 1932, it irrigates $5\frac{1}{2}$ million acres. There are also important canal systems in Madras.

In some parts of India canals are constructed starting from the bank of a river. The water of the river overflows into them in the flood season, but in the hot season the canals dry up, so they are not nearly so useful as the permanent canals and are known as inundation canals.

In most of the drier parts of Peninsular India mud walls are built across the valleys of small streams, so that water collects and forms a pond or lake during the wet season. Such ponds or lakes are called tanks. When the rainy season is over, the water from the tanks can be used, but in the hot season the tanks dry up completely. In bad rainfall years the tanks may not even be filled during the rains.

Although the surface of the land may be dry in the drier regions, there is often water at a short distance below the surface. This water can be reached by wells and brought up to the surface. In recent years hand-dug wells have been replaced in many areas by tube wells which are pumped by electricity.

Famine. In times past India has suffered terribly from famine. The parts which suffer most are those which have a moderate rainfall, but which depend entirely on "dry" crops. In bad rainfall years the crops may fail and the people be without food. Notice that famine is not to be feared in tracts irrigated by large works, but in the dry parts where

irrigation cannot be carried out. The drier parts of the plateau suffer most. In the old days many thousands of people perished, but now there are railways, and food can be sent quickly from one part of the country to another.

The Republics of India and Pakistan. For some two hundred years the British developed a great trade with India. The British East India Company came gradually to control a large part of the country until the possessions of the Company were taken over by the British crown and Queen Victoria became the Empress of India. The country then consisted of provinces ruled by the British Indian Government and large numbers of Native States, some very large, some very small, ruled by their own chiefs. In 1947 the British Government gave India the facilities to determine her own affairs and two entirely separate countries were set up. *Pakistan*, which is mainly Mahomedan, comprises the north-western part of the country (Western Punjab, North-West Frontier Province, Sind, and Baluchistan) together with Eastern Bengal and has its capital at Karachi. *India* (or Hindustan) which is mainly Hindu, comprises the remainder and many of the former states have now been absorbed into the old provinces and other provinces or unions of states formed. The capital is at Delhi.

The Cities and Towns of India. India is essentially an agricultural country, and nine persons out of every ten live in small villages or isolated huts. But with a vast population of 480,000,000 people—over fifty times the number in the whole of the continent of Australia—there must be a number of large towns. We may distinguish:

(a) The four great ports—Calcutta, Bombay, Karachi (Pakistan), and Madras.

(b) The famous old cities of the past, many of them founded thousands of years ago, and full of fine old buildings. Some, like the great capital of India, Delhi, are still flourishing; others progress but slowly.

(c) Cities of modern growth, depending on manufactures or the presence of railways such as Howrah and Kanpur.

Bombay has a fine large natural harbour. Being built on a small island, there is great congestion in the town, for it has

little room to expand. To the east of the island is a fine large sheltered harbour; to the north the narrow waters separating the island from the mainland are easily bridged. Notice the gaps in the hills through which the railways from Bombay pass inland to its fertile hinterland. It is from the plateau region behind that Bombay gets most of the raw cotton for its numerous cotton mills.

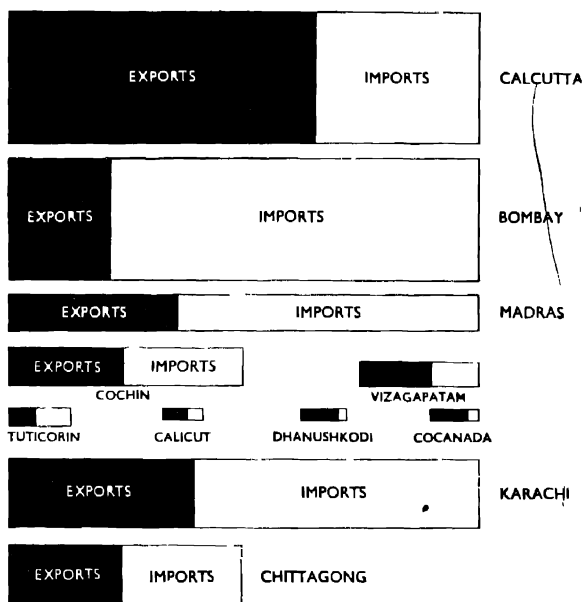


FIG. AS.24.—Trade of the principal ports of India and Pakistan.

Calcutta is the largest city in India, and the second largest (after London) in the British Commonwealth. It was the capital of India until 1912, and still remains the “commercial capital” of India. A hundred and fifty years ago the site of Calcutta was an unhealthy swamp; it has grown to greatness by the labour of man and under the activities of the Government of India. Although 70 miles from the sea on the River Hooghly, it can be reached by large ocean steamers, and it is well situated to receive the products of a vast hinterland—the whole of the Ganges Valley. On the opposite side of the

River Hooghly is Howrah, which really forms part of Calcutta, and which is connected by rail with nearly all parts of India.

Karachi is the capital of Pakistan and the port of Western Pakistan. Although it has not a very good harbour (it is protected by a breakwater), it is the natural outlet of the Indus valley and is rapidly growing. Notice the railways from Karachi. Karachi as an air-port is the front door to India. Regular air services fly to London and to all the great cities of India. *Chittagong* (Fig. A24) now serves East Pakistan.

Madras had (until 1933 when the harbour of Vizagapatam was finished) the only good harbour on the east coast—it is entirely artificial. Madras is the third largest city and the fourth port in India but a long way behind Karachi. There are cotton mills in Madras, and both cotton goods and raw cotton are exported. The tanning of hides and skins and export of leather also belong to Madras.

Delhi, the capital of India, lies between the Punjab Plain and the Ganges Plain. The district around has been constituted a small province, separate from Eastern Punjab and the United Provinces. Delhi is a large city of well over half a million inhabitants; it owes its importance largely to its position. From Delhi any place in the plain, either of the Ganges or Indus, is easily reached. In days gone by, when India was invaded from the north-west, the invaders had to pass by Delhi, because they were shut in by the Himalaya Mountains on the north and the desert on the south. In the old days the land routes of the north-west joined the water routes down the Jumna and Ganges. In modern days Delhi has become a railway centre. The cotton of the surrounding irrigated lands finds its way to the textile mills of Delhi. At a convenient distance to the north are the healthy heights of the Himalayas, on a spur of which Simla has been built. •

Starting from Delhi, we will review the more important localities as one goes down the broad Ganges Valley towards Calcutta. We note first of all that we must pass through Uttar Pradesh (U.P.), and the province (now called State) of Bihar into Bengal. The climate changes, the rainfall getting greater towards the sea. This has an important effect on the

crops. In U.P., amongst the irrigated lands we have already mentioned, wheat and barley are important crops. On the River Jumna stands Agra, formerly one of the great cities of the Mogul Empire and famous for the Taj Mahal, perhaps the finest building in India. In the Ganges-Jumna "Doab"—as the land between the rivers is called—lie collecting and distributing centres, amongst which Aligarh is noteworthy as having a dairying industry. Kanpur (Cawnpore), on the Ganges, has become a railway centre and has many modern

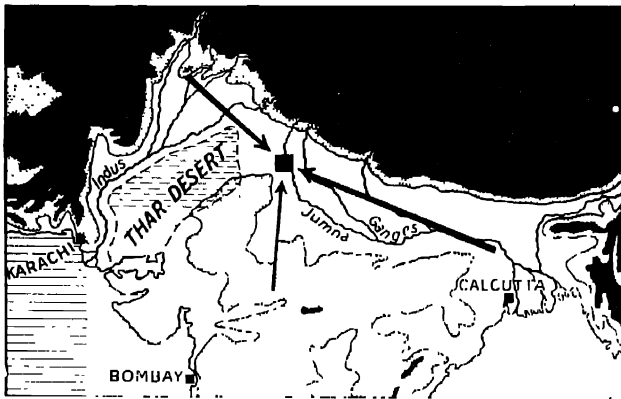


FIG. As.25.—The position of Delhi.

Land over 1,000 feet, dotted; land over 3,000 feet, black

textile factories. Lucknow has long been famous for its gold and silver ware. Allahabad, on the confluence of the Ganges and Jumna, is a place of pilgrimage with a very famous fair, a railway junction and manufacturing town. Banaras is the old seat of learning and the most sacred city of the Hindus. Lying in the state of Bihar is Patna, which has given its name to a certain excellent quality rice. In Bengal there are now several large jute-mill towns on the Hooghly, north of Calcutta. On the border of West Bengal and Bihar are the coalfield centres, such as Asansol as well as the modern iron and steel town of Jamshedpur. In Eastern Bengal (Pakistan) is the old city of Dacca, which is again flourishing. On the healthy heights of

the Himalayas to the north of Bengal lies the hill station of Darjeeling.

Returning now to Delhi and going westwards into Eastern Punjab, we find Amritsar, the sacred city of the Sikhs. Across the Pakistan border in Western Punjab is Lahore, with large railway yards. Rawalpindi guards the main route into



FIG. As.26.—The chief towns of India.

Since Partition in 1947 the Indians have changed many names. The old "provinces" are now called "states." In 1956 a new division into states based on language was brought in as shown in this map.

Kashmir to the town of Srinagar. Peshawar guards the Khyber Pass route and is the centre of the irrigated Vale of Peshawar. Multan is the central town for the very dry south-west Punjab. The fortress of Quetta guards the Bolan Pass. All these are in Pakistan.

In Peninsular India, Jubbulpore and Nagpur are two important centres, both with cotton mills. Farther south, Hyderabad is a very large town in the new state of Andhra Pradesh. Bangalore and Mysore are the chief towns of

JUTE MANUFACTURES	TEA	COTTON MANUFACTURES	HIDES & SKINS	OILS	METALS & ORES	SPICES	RAW COTTON	FRUITS	TOBACCO	OTHERS
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EXPORTS OF THE REPUBLIC OF INDIA 1952-3

GRAIN PULSE FLOUR	MACHINERY	OILS	RAW COTTON	METALS & ORES	VEHICLES	INSTRUMENTS	OTHERS
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IMPORTS OF THE REPUBLIC OF INDIA 1952-3

RAW JUTE	RAW COTTON	RAW WOOL	HIDES & SKINS	TEA
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EXPORTS OF PAKISTAN 1952-3

FIG. As.27.—The trade of India and Pakistan in recent years.

Mysore. In Madras, Ootacamund is the hill station for southern India. Trichinopoly and Madura are two old cities. Cochin on the west coast and Vizagapatam on the east have both been provided with harbours at great cost.

The Foreign Trade of India. Owing to the mountain wall which forms the landward frontier of India, most of India's foreign trade is sea-borne. Together, India and Pakistan have

a large foreign trade—the exports are normally a quarter to a third those of Britain, and the imports rather less.

India used to import large quantities of gold and silver. The poorer classes in India have not yet learnt to appreciate and use savings banks and what wealth they have is in the form

UNITED KINGDOM	UNITED STATES	EGYPT	IRAN	AUSTRALIA	BURMA	ITALY	NETHERLANDS	OTHERS AND GOVERNMENT TRADE
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FIG. As.28.—The trade of the Republic of India by countries (imports).

of gold and silver ornaments. Much of the gold was from the Transvaal. But in recent years India has been exporting some of this treasure, especially the gold. In a hot country like India only cotton clothing is absolutely necessary, hence the former large import of cotton manufactures—mainly from England and Japan. Now most of the clothing materials required are produced at home.

India used to import much sugar from Java but now makes all she needs.

UNITED KINGDOM	UNITED STATES	AUSTRALIA	SOUTH AMERICA	CEYLON	AFRICA	BURMA	HONG KONG	NETHERLANDS	OTHERS AND GOVERNMENT TRADE
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FIG. As.29.—The trade of the Republic of India by countries (exports).

Amongst the exports, the raw cotton is exported almost entirely from Bombay and Karachi; the jute and tea from Calcutta. Wheat used to be exported from Karachi—now there is none to spare.

Figs. As.28 and As.29 show the direction of foreign trade. The large share taken by Great Britain should be noted.

Railways. A very important means of communication in

India is the railway. India has now 43,000 miles of railway. There are two gauges:

(a) The broad gauge, 5 feet 6 inches, including all the more important lines and more than half the railways of India.

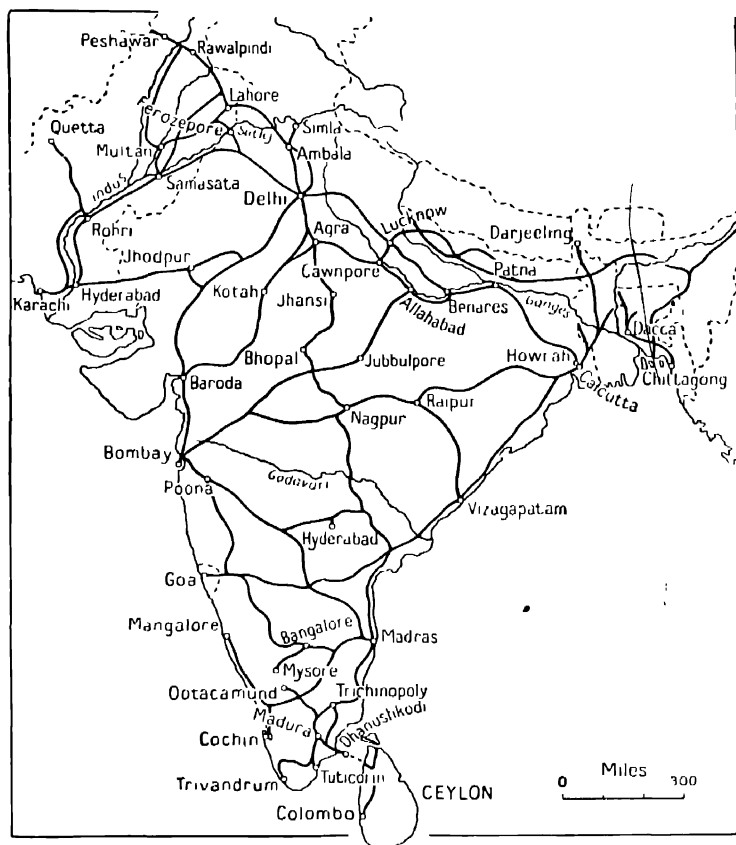


FIG. AS.30.—Railway map of India.

The railways across the Indian-Pakistan frontiers are little used.

(b) The metre gauge, 3 feet 3 $\frac{3}{8}$ inches, used mainly for branch lines.

Some of the hill railways are on a still smaller gauge. Most of the important railways of India run from the chief ports to different parts of their hinterlands, and it is simplest to study

the railways by taking each of the great ports in turn. Follow these on the map, Fig. As.30.

There are four main railways radiating from Calcutta and Howrah; four main lines radiate from Bombay; Karachi really has only one railway, which runs to Hyderabad. From Hyderabad there are two main lines, one on each side of the Indus. Four main lines radiate from Madras.

Apart from these main lines, there are large numbers of branch lines in all the more thickly populated parts of India. Remember there is at present no railway connecting India and Burma, and very little traffic between Pakistan and the Indian Republic.

Roads. When compared with other civilised countries, India still has few metalled roads. There are a few "trunk roads," such as the one from Calcutta to Peshawar, which were commenced before the days of railways, and these have recently become more important with the increase in the number of motors. During the 1939-45 war there was need to transport goods quickly, especially to the Chinese border, and many roads were built.

Rivers. It has already been explained that the rivers are much less important than formerly, owing to the growth of the railways and the use of river water for irrigation.

The River Ganges and branches are used below Patna. Except for the Calcutta and Eastern Canals, the canals of India are little used for transport; they are for irrigation.

Airways. Not only is India on the regular route from Europe to Australia, but the chief towns are now linked by regular services. India can be reached in a single day from London.

BURMA

Until 1937, Burma was part of the Indian Empire. Indeed it formed the largest Province with an area of 260,000 square miles or more than twice the size of the British Isles. From 1937 to 1947 it was a separate country of the British Commonwealth. In January 1948 by agreement with Britain it became an independent republic. Like India it is a monsoon country

and like India is cut off from its neighbours by walls of mountains. Unlike India it has comparatively few people—only about 20,000,000 and there are great opportunities for increased production. Most of the people are Burmans, allied to the Chinese and quite different from the Indians. The Burmans are Buddhists but there are also between one and two million hill tribesmen such as Chins, Nagas and Shans, many of whom are spirit-worshippers. About a million Indians lived in the country before 1941 and a considerable number of Chinese. In 1941 Burma was invaded by the Japanese from the south and nearly the whole country was occupied by them from 1942 to 1945. Great destruction was caused, many towns including Mandalay were almost completely destroyed, railways, roads and factories demolished and recovery must be slow.

Physical Regions. The heart of Burma is the basin of the great river Irrawaddy which is navigable for steamers to nearly a thousand miles from its delta to Bhamo. Its tributary the Chindwin is also an important highway. The country falls naturally into about seven physical regions.

(1) The Arakan Coast is the very wet coastland facing the Bay of Bengal. There are many ranges of thickly forested hills parallel to the coast and only a few small alluvial plains where rice can be grown as around the port of Akyab. Unlike the coast of India, the Arakan coast is very irregular and there are many islands.

(2) The Arakan Yoma is a range of mountains broadening out northwards into a number of parallel ranges enclosing plateaus (such as that of Manipur) and separated by deep valleys. Some of the mountains rise to over 10,000 feet and are thickly forested. Only a few hill tribes live in this region which forms a remarkably complete barrier between Burma and India, though it was crossed by the 14th Army when they invaded Burma to drive out the Japanese.

(3) The Northern Hills include the valleys of the Chindwin and the upper Irrawaddy but the region is forested and has few people.

(4) The Dry Belt, with a rainfall of less than 40 inches, lies in the heart of Burma. It is largely a plain which is cut off

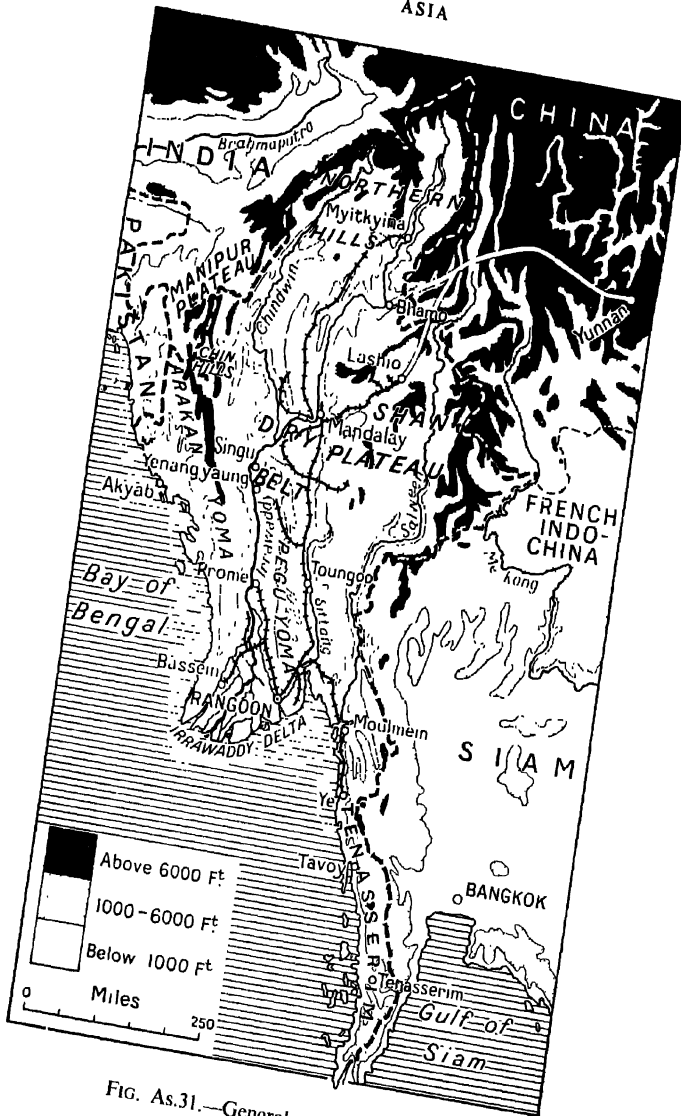


FIG. As.31.—General map of Burma.

from rain-bearing winds by the Arakan Yoma. In the centre the rainfall is actually less than 20 inches and the country is semi-desert except where water from the Irrawaddy or one of its tributaries can be used to irrigate the land. But this is an important part of the country, with the old capital of Mandalay and many other interesting old towns. Dry Zone crops such as cotton, millet, and ground nuts can be grown as well as irrigated rice and it is here that the important oilfields are found, notably at Yenangyaung and Singu. The oil is sent by pipe line to refineries near Rangoon.

(5) The Irrawaddy Delta is a flat alluvial delta and one of the greatest rice-growing regions in the world—especially important because it grows far more rice than the people need and there is a large surplus for export. Much rice is also grown in the valley of the Sittang which is separated from the Irrawaddy by the low forested range of the Pegu Yoma. Rangoon, the capital and chief port of Burma is situated on a small river with water communication to the Irrawaddy so that it controls both land and water routes into the heart of the country. Bassein is a rice port on the west of the delta. The Pegu Yoma and other hill ranges where the rainfall is between 40 and 80 inches a year yield the teak wood for which Burma has long been famous. The Burma ironwood (pyinkado) grows where it is slightly wetter and is used for railway sleepers or ties because it is not eaten by white ants.

(6) The Shan Plateau, with an average elevation of between 3,000 and 4,000 feet, occupies the whole of the east of the country. It is partly grassland, partly forest, and is inhabited mainly by Shans. In the north are the once-famous ruby mines, no longer important, and the largest deposit of silver-lead-zinc ores known in the world. Farther south are tin mines.

(7) Tenasserim is the name given to the southern extension of Burma which shares with Siam the isthmus leading to Malaya. The climate, wet all the year round, suits rice and rubber, but much of the land is very hilly and forested. There is a large production of tin ore, as in the neighbouring part of Siam and Malaya. The chief town is Moulmein. This is a very

irregular coast and is fringed with innumerable islands. But there are no large ports because the hinterland is small.

Communications and Trade. From Rangoon railways have been built to the north and roads lead to the Shan States and the famous Burma road is the "back door" into China. Before the Second World War Burma had a large export of rice, oil, teak, silver, lead, tin, oil, oilseeds and cotton. She imported manufactured goods.

CEYLON

Position. Ceylon is an island situated to the south of Peninsular India. It must once have been joined to India, and in many ways it is very similar. Ceylon is roughly pear-shaped and is rather smaller than Ireland or Scotland, its area being about 25,000 square miles. The distance from north to south is 270 miles. It reaches nearer the equator than any part of India or Burma, and Colombo is only 7° N.

Physical Features. Ceylon consists of a central mass of mountains surrounded by coastal lowlands and plains of varying width. Many of the central mountains are high; the highest is more than 8,000 feet. In the north the coastal plain is flat and there are several sandy peninsulas. The end of the Mannar peninsula is only 22 miles from the nearest point of India (Dhanushkodi). Ceylon is very nearly joined to India between these two points by a line of sandbanks and rocks called Adam's Bridge.

Geology. The mountains of Ceylon consist of the same old, hard, crystalline rocks as South India. These rocks also underlie the coastal plain, but there they have been covered by a thick coat of *laterite*. Laterite is a rock which is formed in hot, wet countries by rain acting on other rocks. The old crystalline rocks at the surface have been completely changed by the action of rain-water and turned into a much softer, red or brown rock, full of holes. In the north of the island the old rocks have been covered by soft limestone. Fringing the coasts there are often sand dunes, behind which are shallow lagoons. The old crystalline rocks of Ceylon are noted for their gemstones such as sapphires and for the mineral graphite.

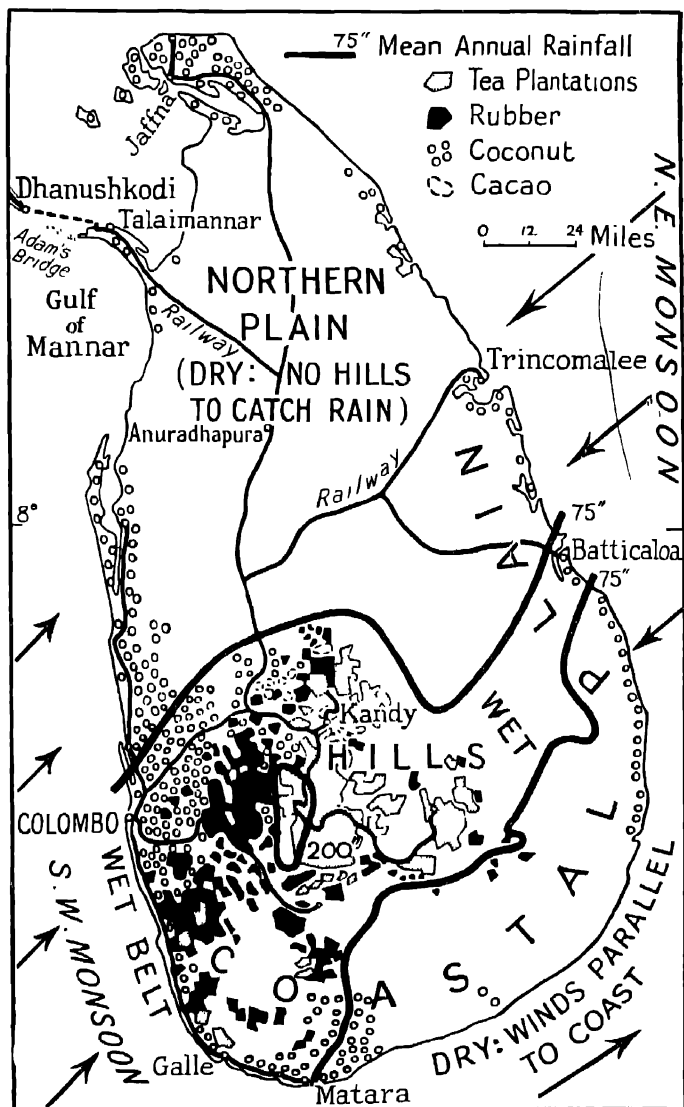


FIG. AS.32 —General map of Ceylon.

Notice how nearly all the cultivation is on the wet, south-western side of the hill country.

Climate. Ceylon is nearer the equator than India, and so is hot all the year round. The presence of the sea keeps the climate equable, and everywhere along the coast land and sea breezes are felt. There is little difference between the temperature of day and night, that is, the "daily range" is very small. At Colombo it is only 12 degrees. The annual range is also very small. January is the coolest month (78 degrees), and May the hottest, but at Colombo there is only a difference of 5 degrees between the two.

The western coast of southern India gets a heavy rainfall from the South-West Monsoon, whilst the eastern coast gets much of its rain in the months of November, December, and January, when the North-East Monsoon has begun to blow. Ceylon gets its rain from both monsoons. There is a heavy rainfall on the west and south-west coasts and the mountains from the South-West Monsoon. There is a heavy rainfall on the north-east coast and eastern slopes of the mountains later in the year from the North-East Monsoon. The northern part of the island has no hills to intercept the winds, and is a dry region. So also is the south-eastern part of the island. Thus, although Ceylon is not a very large island, its climate varies.

Vegetation. Just as the climate of Ceylon varies a great deal, so does the natural vegetation. The lower slopes of the mountains used to be covered with thick evergreen forest. Now many of these forests have been cleared away to make room for rubber plantations and tea gardens, and there is little timber of value left. Taking the whole of Ceylon, about one-fifth is cultivated. Thick forests cover about one-fifth of the area, and there is a large part covered by scrub and waste land which might be used.

Population. There are rather over 9 million people in Ceylon. The principal race is the Sinhalese (or Cingalese), who, between 2,000 and 3,000 years ago, came from the north of India and conquered Ceylon. The Sinhalese are Buddhists by religion. At Kandy is the Temple of the Tooth, which is one of the most sacred places in the world to Buddhists. The north of Ceylon is inhabited mainly by Tamils, who are Hindus by religion, and who came over from India either as warriors in

past ages or more recently as labourers in the tea gardens and coffee and rubber estates. In the wilder parts of the mountains there are still a few Veddas, a very primitive hill tribe. The people live mainly on the wetter parts of the plains and on the hills. On the dry, infertile soils of the northern regions and the east there are very few people partly because malaria and other diseases have caused the people to move elsewhere.

Government. Ceylon is entirely separate from India in matters of government. The first Europeans to settle in the island were the Portuguese in 1505, followed by the Dutch, and later by the English. The old Dutch ports are still to be seen at Galle and other places. Ceylon was separated from the Presidency of Madras in 1802 and made a Crown Colony, and so became a separate country of the British Commonwealth. It was accorded self-government in 1946 and became a Dominion in the Commonwealth.

Natural Regions. Ceylon, though only a small country, can be divided into three natural regions:

(1) The Hill Country, comprising the central mountain mass of the island, roughly the land over 1,000 feet.

(2) The Maritime Belt, or Coastal Plain of the east, south, and west.

(3) The Northern Plain, occupying the northern end of the island.

Most of the rubber plantations are found on the wet western plain and the lower hillsides. There are also a few cacao (cocoa) plantations. In the hill country are nearly all the tea gardens. In the valleys rice is grown and many of the valley sides are carefully terraced for the growth of rice. Kandy, the old capital, is in the hill country, and is reached by a hill railway as well as by road from Colombo, 72 miles away.

- All along the coast of Ceylon, thrown up by wind and waves, there are lines of sand dunes; just as on the west coast of India, large brackish lagoons are found behind the sandy ridges. The wet lands are thickly populated and the level stretches are occupied by rice-fields, yielding two crops a year, one after each monsoon. On the sand-dunes are groves of coconuts. The husks are allowed to soak and rot in the shallow

lagoons, so that the fibre (coir) may be easily obtained. Industries connected with the coconut find employment for a large number of people. The kernels are dried for export as copra. Carefully dried or "desiccated coconut" is also exported; there are also factories for the preparation of coconut oil. Of the spices for which Ceylon has long been famous, cinnamon is the most important. The cinnamon tree likes a very light sandy soil, and grows in those parts of the maritime belt where such a soil is found. The cinnamon is obtained from the inner bark of young shoots. Other spices are cardamoms and cloves. Citronella oil, prepared from a grass, is obtained mainly in the south-west of the island.

Round the coast fishing is an important industry. The boats of the fishermen are made either of stems of palm trees

COCOANUTS 26%	RICE 24%	RUBBER 15%	TEA 13%	CINNAMON 3% CARDAMOM 1% CLOVES 4%	OTHERS 18%
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FIG. As.33.—The crops of Ceylon, according to the area of the total cultivated land they occupy.

or planks of wood, and are very narrow. They would roll over in the water, but they have a log of wood on one side, which forms a float. The float is not tied close to the boat itself but 6 to 12 feet away, so that the boat is really like two boats joined together by two cross poles, except that one of the boats is only a log of wood.

The capital of Ceylon, Colombo, is on the west coast. There is a bend on the coast which partly shelters a small harbour from the full force of the South-West Monsoon. Now a fine breakwater encloses an artificial harbour and Colombo is not only the principal port of Ceylon, but is situated on a great ocean highway from Europe to the Far East. Colombo is a sea junction, like a railway junction, but on the sea routes of the world, for here the main trade route goes on to Singapore and China; but there are branches from Colombo

to Madras and Calcutta, to Rangoon, and an important one to Australia (see Fig. 112).

The Northern Plain is formed partly of a pale limestone, sometimes covered by a thin bright red soil. Most of this region gets about 40 inches of rain, but the soil is dry and poor, and there is much waste land covered with scrub jungle. Cultivation is protected by numerous "tanks," mostly very old. The Gulf of Mannar is famous for its pearl fisheries.

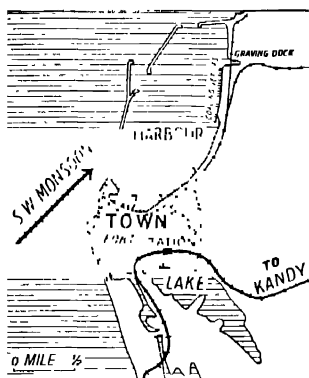


FIG. As.34.—Sketch-map of Colombo Harbour, showing how it is protected from the South-West Monsoon.

Communications. Colombo is the centre of the broad-gauge Ceylon Government Railways. There are numerous excellent roads in Ceylon which link up outlying places with the railways.

The Trade of Ceylon. In value the trade of Ceylon is a very large one, the exports being more than the imports. Nearly all the trade passes through the great port of Colombo. Ceylon has three main exports (see

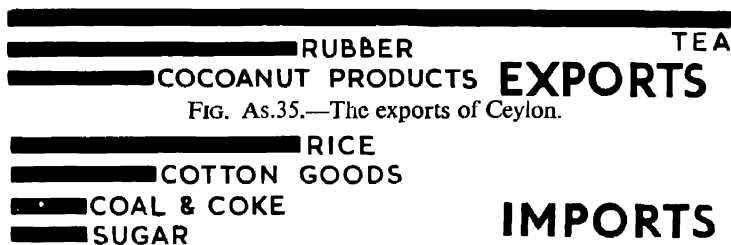


FIG. As.36.—The imports of Ceylon

Fig. As.35)—tea, coconut products, and rubber. Although Ceylon has not a very large population, it does not grow enough food for its people, and imports much rice, especially from Burma. The other imports are similar to those of India.

QUESTIONS

1. Give an account of the causes of the South-West Monsoon. How does it affect India?
2. In what ways has the physical structure of India affected her history and commerce?
3. How would you account for the comparatively small population of Burma?
4. Draw from memory a map of India, showing the mountains, valleys, plains, and hills, the passes through the mountains and the chief railways.
5. Compare and contrast Calcutta and Colombo as world ports.
6. Show by a series of sketch-maps, drawn from memory, the connection between rainfall and the chief grain crops of India.
7. Divide India into vegetation regions, and describe in detail any one.
8. If you were a farmer and could choose a farm anywhere in India where would you select for your farm (give reasons), and what crops would you grow?
9. Write an account of the mineral resources of India and Pakistan. Illustrate your answer by sketch-maps.
10. In what ways has the foreign trade of India changed within the last hundred years?
11. Compare and contrast the valleys of the Indus and Ganges Rivers from the economic and historical points of view.
12. Write a brief account of the climate of Ceylon. Illustrate your answer by sketch-maps.
13. What are the chief products of Burma? Where are they produced? For what are they used? To which countries are they sent?
14. There are several different types of forests in India. Where exactly do these forests occur and what is their value to man?
15. Give a brief account of the different types of people who live in the Ganges Valley.
16. Of what commercial value to India is Peninsular India?
17. Which do you consider to be the eight chief ports of India and Pakistan? Write short notes on each showing your reasons for your selection.
18. In what ways might the trade between India and Burma be increased?
19. How did the First and Second World Wars affect India's foreign trade?
20. Describe, with the help of sketch-maps, the connection between the climate and the natural vegetation of India.

INDO-CHINA

1. Between India and China there is a large peninsula projecting southwards. It is really a broad peninsula in the north (Indo-China) with a long, narrow peninsula (Malay Peninsula)

stretching southwards almost as far as the equator. The broad northern part has a typical monsoon climate; the narrow Malay Peninsula is in the equatorial region. Notice that Burma is part of the broad peninsula. It is interesting to note that the French often used to call Burma "British Indo-China." The other countries of Indo-China are the kingdom of Siam or Thailand and the countries which previously formed French Indo-China.

SIAM (THAILAND)

Siam or Thailand (the land of the free) is a kingdom about twice the size of Britain but, like Burma, with only about 21,000,000 people. It is enclosed by mountains on nearly all sides and can be divided into four almost equal parts.

Central Siam, the heart of the country, is an alluvial plain much of which is flooded in the wet season.

Northern Siam consists of hills and valleys running from north to south.

North-eastern Siam is a low plateau, rather dry.

Southern or Peninsular Siam, is mainly mountainous.

Siam has the same seasons as India. When the North-East Monsoon is blowing Siam lies in the rain-shadow of the Annamese Mountains, but from June to September the warm, moisture-laden winds blow up from the Gulf of Siam and deposit a good rainfall, except where there are protecting lines of hills. Southern Siam is nearer the equatorial region and has rain most of the year.

Rice is grown over the flat lands; it is by far the most important crop, the staple food of the people, and the principal article of export. The hills of northern Siam are forest-covered and much teak is worked. The logs are floated down by river to Bangkok. In Southern Siam, lying between Lower Burma and Malaya, much tin and wolfram are produced, and there are rubber plantations. The Siamese are very similar to the Burmans, and they are Buddhists. Notice how extraordinarily alike Burma and Siam are. Bangkok, the principal port, lies a few miles up the River Menam¹; but the

¹ Menam = the river; strictly the Menam Chao Phya or River Chao Phya

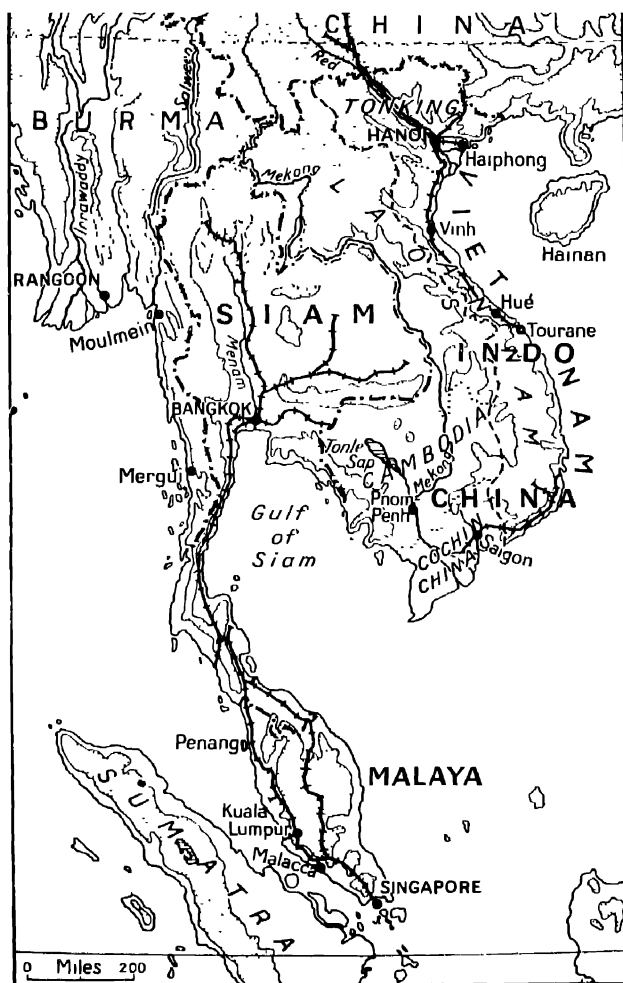


FIG. As.37.—Map of Indo-China.

Notice the countries—Siam, Malaya, Cambodia, Laos, and Vietnam—into which it is divided. Land over 1,000 feet is dotted. Notice the railway from Bangkok to Singapore. What are the lines marked across the north and south of this map? Note the position of Bangkok on the Menam (or River) Chao Phya. It used to take 4 days to travel by steamer and train from Rangoon to Bangkok, now aeroplanes fly over the mountains in a few hours. In 1945 the Government of Siam announced that they would build a new capital at Saraburi, north of Bangkok, the existing capital, but this has not yet been done.

river is shallow, and has a sand bar near the mouth. There are railways from Bangkok to the north and north-east of the country, and a railway runs southwards right through to Singapore. As in Burma, the imports are cotton goods, foodstuffs, metals, and machinery.

INDO-CHINA

Before the Second World War the eastern part of the Indo-Chinese peninsula constituted French Indo-China. The country was occupied by the Japanese from 1941 to 1945 and after liberation many changes took place. Three independent countries were set up—Cambodia, Laos and Vietnam, but in 1954 the Communists gained control of the north of Vietnam so there are really four countries. The whole falls geographically into four parts:

(a) The rich rice-growing lands of Cambodia and Cochin China, which are similar to the alluvial plain of Siam. This lowland region is the hinterland of the port of *Saigon*. This is one of the great rice lands of the world, and more than half the total crop is exported. Rice forms the main export of the three countries of Indo-China. The rice is milled in the busy city of *Cholon* and exported from *Saigon*, 5 miles away. Notice that the Mekong runs through the great plain; but *Saigon* is *not* on the Mekong. Compare this with *Rangoon*, which is *not* on the Irrawaddy; *Calcutta*, which is *not* on the Ganges; and *Karachi*, which is *not* on the Indus—all of them on smaller rivers near the main one. In the centre of Cambodia is a huge lake, full of fish. Fishing is an important industry, fish forming the second article of export. *Pnom-Penh* is the chief town of Cambodia. In the heart of Cambodia are the celebrated ruins of Angkor, centre of a remarkable civilisation that flourished centuries ago.

(b) The mountainous region of Annam, which, although it produces cinnamon, sugar, and tea, is of much less importance. *Hué* is the principal town, and *Tourane* the port.

(c) Tonking, or the hinterland of the port of *Haiphong*, corresponds roughly with the northern (Communist) half of Vietnam. This is another rice-growing area formed by the delta

of the Red River. It has rich mines of coal, tin, and zinc, as well as enormous limestone quarries, Portland cement being made from the limestone. Much raw silk is also produced. *Hanoi* is the chief town.

(d) The interior, or Kingdom of Laos, is sparsely peopled, the capital is Vientiane on the Mekong.

Living with the native people (Annamites, Cambodians, etc.) are many Chinese.

MALAYA

The southern portion of the Malay Peninsula is part of the British Commonwealth. Before the Second World War Malaya consisted of the British Colony of the Straits Settlements, including Singapore, Penang, and Malacca, and nine Malay States on the mainland, four of which formed the Federated Malay States. Malaya was attacked by the Japanese in 1941 and occupied by them until 1945. After liberation the nine States and the settlements of Penang and Malacca formed the Malayan Federation. Singapore, Penang, and Malacca are old trading centres. Malacca was occupied as long ago as 1511 by the Portuguese. Singapore was important in the fourteenth century until destroyed by the Javanese in 1377. Later, the importance of the position of Singapore Island was recognised by Sir Stamford Raffles who bought it for Britain in 1819. Malaya became independent within the Commonwealth in 1957 followed by Singapore a little later.

Malaya has a backbone of high mountains, with several parallel ranges on either side. The western side is more developed than the eastern, for it is there that vast quantities of tin ore are found in the valleys. Malaya produces more than one-third of the world's supply of tin.

Malaya lies in the equatorial region, and all the hilly parts were covered with equatorial forests. In the early part of the present century it was found that the climate was very suitable to the growth of the rubber tree, and now enormous areas of the country are covered by rubber plantations, Malaya producing nearly half of the world's supply. There are also many coconut plantations, and copra is exported. The chief food grain of the people is rice, but not sufficient is grown for the people's needs, and much has to be imported.

Tin and rubber have made Malaya very rich. Fine motor roads have been built all over the country, and two railways run through the length of the country from north to south and connect with the Siamese railways. The natives—the Malay—are Mahommedans, but much of the trade of the country is

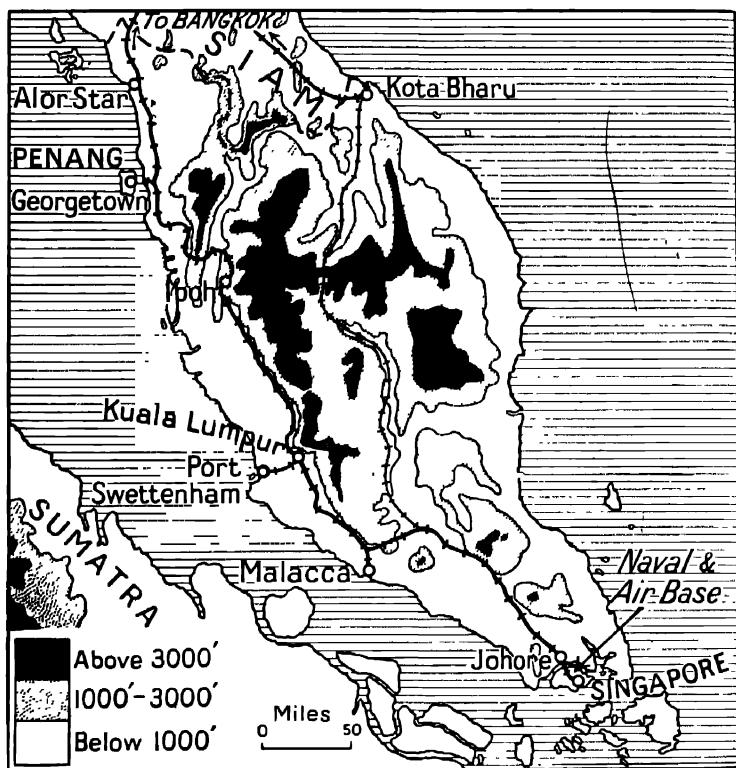


FIG. As.38.—Map of Malaya.

in the hands of Chinese. There are also many Indians who have been brought in to work on the rubber plantations.

The capital of the Federation of Malaya is *Kuala Lumpur*. Most of the trade of the mainland passes through Penang and Singapore. Like many British trading stations and harbours, the two principal ports of the Malay Peninsula—Singapore and

Penang—are both islands. The sheltered harbour of Penang (the proper name of the town on Penang Island is Georgetown) lies between Penang Island and the mainland. Singapore



FIG. As.39.—The trade of Malaya

Island is connected with the mainland by a railway and a road, and its harbour is on the south of the island, but a great naval base has been built on the north side.

Much of the rubber produced in Malaya is exported through Penang, but the trade of Singapore is twice as great.

Singapore is just like a huge market. Products from the surrounding countries are brought there and sold to merchants. The merchants then sell the produce again and send it to all parts of the world. So we find Singapore exports much the same things as it imports. There are works where tin ore from Burma and the Malay States is smelted into tin, but in many cases the

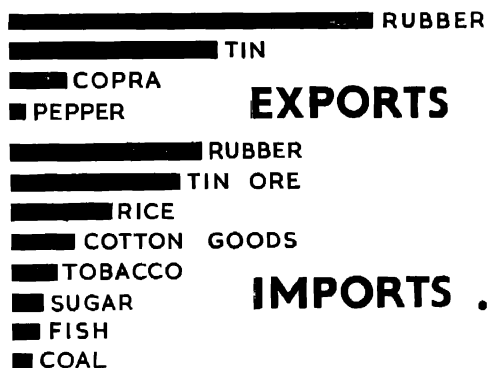


FIG. As.40.—The trade of Singapore and Penang. Principal articles.

This trade is nearly as valuable as that of the whole of Australia. This diagram shows that the trade is largely an entrepôt trade. Rubber is imported only to be exported; tin ore is smelted and exported as tin.

various products which come to Singapore are sent away again without going through any process of manufacture. Singapore imports rice to feed its people and clothes to clothe them. These points are illustrated in Fig. As.40. On a map of the world study carefully the position of Singapore in relation to world trade routes. Notice how all traffic from Europe *via* the Suez Canal and the Indian Ocean going to the Pacific must pass by or near Singapore. It is a very important junction of air routes too. In the light of all these facts, it is not surprising that Singapore is one of the world's great ports and has attracted a population approaching a million—largely Chinese.

The famous old spice port of *Malacca*, on the mainland of the peninsula, is now little used.

THE EAST INDIES (INDONESIA)

The East Indies are a large group of islands lying along the equator and between Asia and Australia. Except the north of Borneo, nearly the whole of the East Indies became Dutch territory. Just as the British Indian Government grew gradually out of the East India Company, so the administration of the Dutch or Netherlands East Indies grew out of the Dutch East India Company, founded in 1602. The largest islands are Borneo and Sumatra, but the most important is Java. Other important islands are Celebes and the Moluccas. The island of Java is the same size as England, and has even more people although it is an agricultural country. The native Javanese are Mahommedans, but there are many European and Chinese merchants. The staple food grains of the people are rice and maize, but the crops grown for export are sugarcane, coffee, rubber, coconuts, cinchona, tobacco, and manioc (from which tapioca is made). Java sends rubber, sugar and tea to Europe and imports in exchange manufactured goods.

There are important oilfields in Java and Sumatra, also some coal mines, whilst tin ore is found on two small islands off Sumatra (Banka and Billiton).

Although Java is such a small island the export trade is normally two-thirds that of Australia. The principal town

and port is *Jakarta*, previously known as *Batavia*. Other ports in Java are *Sourabaya* and *Samarang*.

The other islands are still largely undeveloped and partly covered with thick equatorial forest; the interior of Borneo, the second largest island in the world, is little known and has few people.

From 1941 to 1945 the Netherlands East Indies were occupied by the Japanese. A movement for self government led



FIG. AS.41.—The East Indies.

to the establishment of the Republic of Indonesia with headquarters in Java at Djokjakarta. The Republic now covers all the former Netherlands East Indies except western New Guinea.

The northern part of Borneo is under British protection, and is divided into British North Borneo (with Labuan), Brunei, and Sarawak. Sarawak is as large as England and for over a hundred years (1842 to 1946) was ruled by a British Rajah. It has now become a British Colony. These countries have become important because of the discovery of oil. The climate is also suitable for rubber and the forests are a very valuable possession of the island.

The Philippine Islands lie to the north-east of Borneo, and, formerly belonging to the United States, were recently given independence. They lie outside the equatorial rain belt, and feel the influence of the monsoons. There are about 23,000,000 people in the islands, mostly Filipinos, and nearly all Christians. About one-eighth of the area of the island is cultivated; the principal crops are rice, manila hemp, coconuts, maize, sugar-cane, tobacco, and bananas. The Philippine Islands are amongst the foremost producers of copra and coconut oil in the world, whilst sugar, manila hemp, and tobacco are valuable exports. The islands do not grow sufficient rice to feed the people, and more is imported, but most of the imports are manufactured goods. The principal town and port is *Manila*.

THE CHINESE REPUBLIC

In 1912 one of the world's oldest empires—the Empire of China—became a republic. The old Chinese Empire included the rich, thickly populated region of China Proper, and also Manchuria, together with the huge but less important “outer territories” of Chinese Turkistan, Tibet, and Mongolia, all largely desert. The Japanese seized Manchuria in 1931 and set up an Empire which they called Manchukuo, with an “Emperor” of their choosing. The Chinese Republic was steadily gaining strength when the country was invaded, in 1937, by the Japanese. In 1938 the Japanese established control over a large part of China. The Japanese were defeated by Anglo-American forces in 1945 and driven out of the country, but there followed civil war between the “Nationalist” Government and the Communists. The latter were victorious and established control over the whole of China proper and Manchuria, except the island of Formosa, now called Taiwan, to which the Nationalists retreated.

CHINA PROPER

Position and Size. China is about the same size as India, but has even more people. It is almost entirely outside the Tropics.

Many hundreds of years ago the Chinese built the Great Wall of China to protect themselves from raiders from Mongolia. This wall still marks roughly the northern limit of China proper.

Physical Features. To the west of China lie the high plateaus of Central Asia. The plateaus of Yunnan fade away gradually into the mountainous region of Southern China, whilst farther north the Plateau of Tibet sends out fingers of mountains eastwards. Two of these fingers enclose the famous and important "Red Basin" through which the Yangtze flows. The whole of China may be described as mountainous except for the Great Plain of China in the north-east and the plains of the Yangtze. The Hwang Ho, called "China's Sorrow" because of its disastrous floods, used to find its way to the sea south of the mountainous Shantung Peninsula, but in 1852 suddenly changed its course, and entered the sea north of the peninsula. For a few years it again changed its course, but in 1947 returned to the northern channel. Notice how this great river plain is overlooked by the plateau.

The two great rivers of China are the Hwang Ho and the Yangtze. The Yangtze is navigable for a long distance, right into the Red Basin, and affords one of the most important highways of trade. In the south the Si-kiang, or West River, is of great importance. Many other smaller rivers are navigable, and there are numerous canals. Note that the Chinese word "kiang" means river.

Climate. China is not shut off from the interior of Asia by any great chain of mountains. Consequently, when the interior of Asia gets very cold in the Cold Season, China gets very cold too, and suffers icy winds from the cold interior. In January the northern half of China is below freezing. The winds are not only very cold but very strong, and bring great dust clouds from the dry desert regions. The greater part of Northern China is covered with a great mantle of this dust or loess. By May, the interior of Asia has become warm and the monsoon commences to blow. It blows from the south or south-east, but is not as strong as in India. It is this wind which brings the rain. China has then a monsoon climate

somewhat like that of India, the main difference being that the winters are very cold. The rainfall is heavier in the south than in the north; the south is also warmer.

Vegetation and Crops. Although China, like India, has

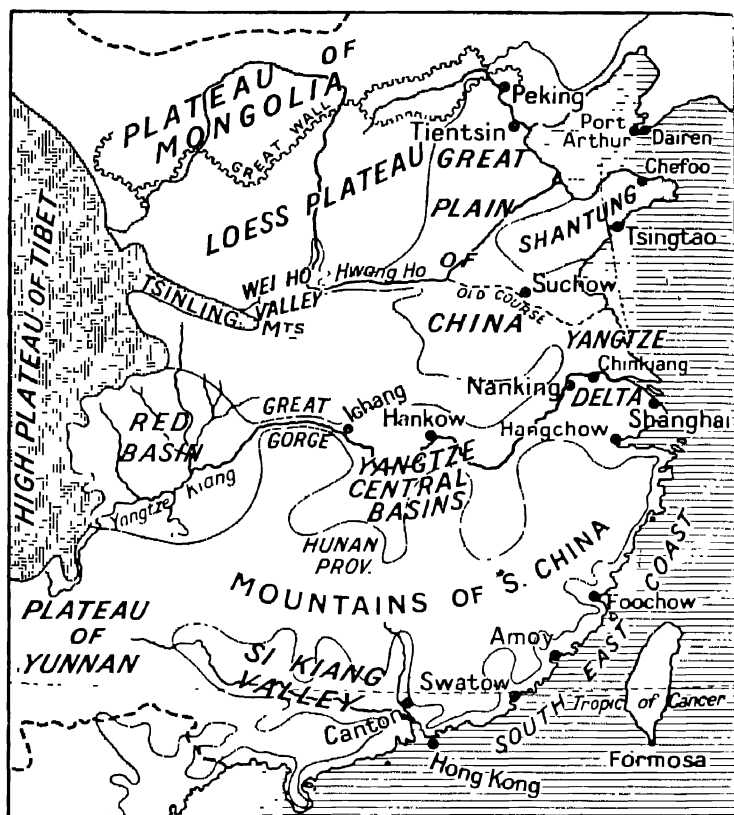
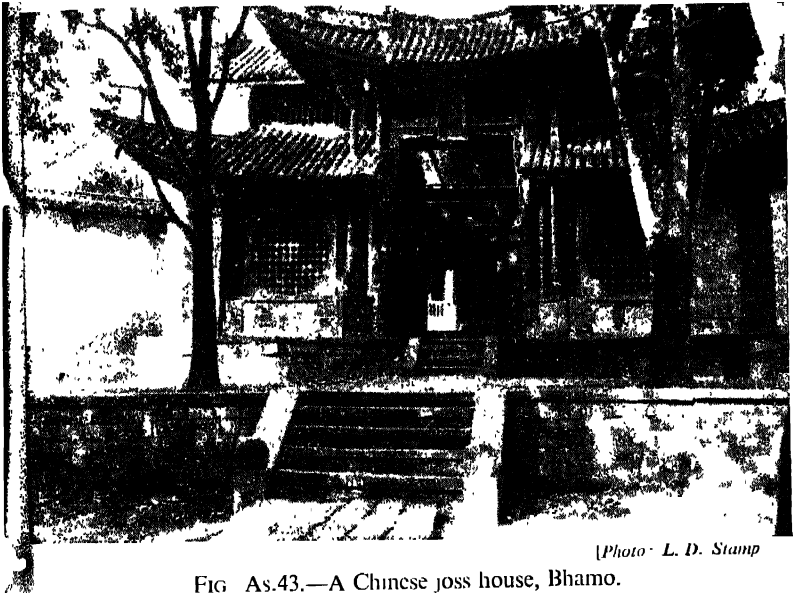


FIG. As.42.—Diagrammatic map of China, showing roughly the main river valleys and plains.

monsoon rains, it is very much colder in the cold season, and natural vegetation is different. The hills used to be clothed with a forest of mixed evergreen and deciduous trees, but most of the hillsides have been barren for centuries, all the wood having been used for firewood. Like India, China is essentially

an agricultural country. Generally the crops are very mixed, and the clever Chinese have practised "rotation of crops" and extensive cultivation for long ages. Except in the north, over the Hwang Ho plains, there are no very large areas of flat land. Yet the population is as large as that of India. Therefore the Chinese farmer has to cultivate his land very carefully. Each farmer grows several grains as well as fruit trees, and probably grows a little tea; he also keeps pigs as well as silkworms.



[Photo - L. D. Stamp

FIG. AS.43.—A Chinese joss house, Bhamo.

The architecture, with the curved roof, is very characteristic

Irrigation is often necessary, especially in the loess areas of the north. In the north the chief food crops are wheat, barley, millet, peas, and beans; in the south rice and sugar are most important. But China grows scarcely enough food for her people, and sometimes famines occur. Cotton is an important crop, especially in the Yangtze Kiang Valley; whilst tea is grown in the south and west. Pigs are reared everywhere, and fat pork is a favourite food of the Chinese. There are

also large numbers of sheep. Silk culture is one of the oldest industries in China.

When Europeans first began to trade with China they found there was little the Chinese wanted. They made their own beautiful silks and fine cottons by simple but effective hand-loom. So the "industrial revolution" came late to China. There are now large cotton and wool mills and silk factories in Shanghai, Canton, and other large centres, as well as flour mills. During the Second World War, when the Chinese government was driven into the heart of the country, the Chinese were forced to learn modern western methods very quickly, and so recently changes have been very great. But the interior is less forward. Progress has been hindered by civil war and foreign invasions, but the Communists are pushing ahead with industrialization and modernization.

Minerals. China is believed to have many mineral resources. There are rich coalfields, and production has recently jumped to over 100,000,000 tons. There are extensive iron ore deposits in Shansi and good quality ores at Tayeh, near Hankow. There are rich copper deposits in Yunnan, and tin ore is produced north of Canton and in Yunnan. Hunan produces half the world's supply of antimony. Gold and silver are also mined.

Population. The distribution of people may be compared with that in India. Population is densest in the Great Plain (Hwang Ho), the Yangtze Basin, and the coast lands, and least in the mountainous regions. The total number of people was declared to be 589,000,000 in 1953. The Chinese are mostly Buddhists or Confucians. The language varies from one part to another, but efforts are being made to standardise it.

Natural regions. China can be divided into the following large regions:

- (1) The Lower Valley of the Hwang Ho, or the Great Plain.
- (2) The Loess Plateau of the North-West.
- (3) The Shantung Peninsula.
- (4) The Central Basins and Delta of the Yangtze.
- (5) The Upper Valley of the Yangtze (Red Basin).
- (6) The Valley of the Si Kiang, or West River.

(7) The South-Eastern Coast.

(8) The Mountainous West and the Plateau of Yunnan.

The Great Plain of Northern China and the Loess Plateau of the North-West have warm summers and very cold winters, and rather a poor rainfall. Wheat, peas, beans, and millet are the staple crops. Ground-nuts thrive on the poor, sandy soils. In the extreme north is *Peking* (once again the capital), but the

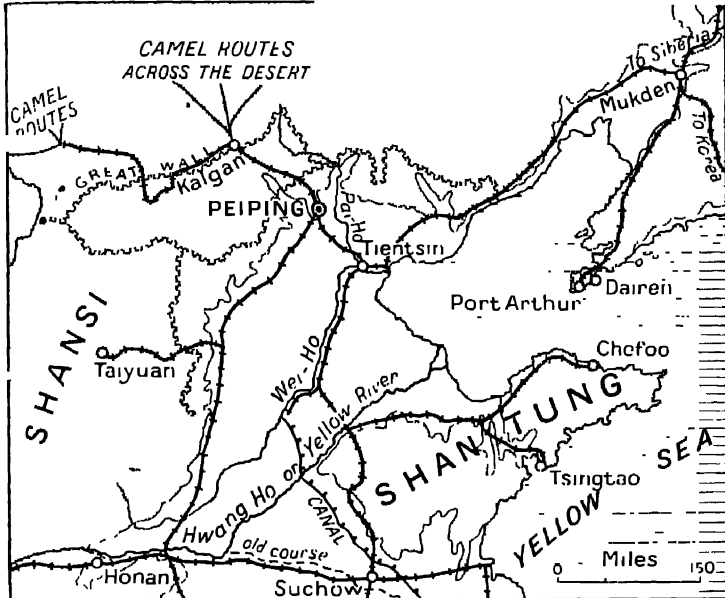


FIG. As.44.—The position of Peking, meaning Northern Capital, called Peiping from 1928 to 1949 when Nanking was the capital.

All land over 600 feet is dotted. Notice the old course of the Hwang Ho. Motor routes have replaced camel routes.

trade centre is the port of *Tientsin*, on the navigable *Pei-ho*. From this port routes radiate to all parts of China. *Suchow*, farther south, is near the old bed of the *Hwang Ho*, which the river occupied until 1852.

The **Shantung Peninsula** is a hilly region of old hard rocks, lying between the old and new mouths of the *Hwang Ho*. It is the most important of the silk-producing regions of China, the silkworms living on the oak trees of the hills. *Chefoo* and *Tsingtao* are the two ports.

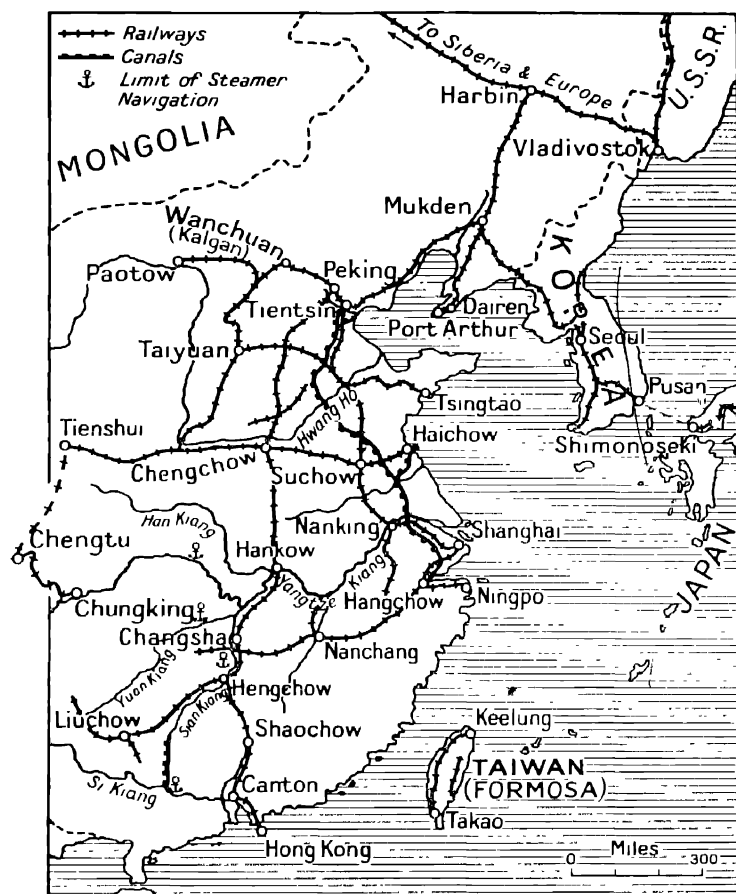


FIG. As.45.—The communications of China.

Notice especially the few railways and the difficulty of travelling from north to south in China until the completion of the railway in 1936. Navigable rivers and the Imperial Canal are also shown. There is now a railway from Peking through Mongolia to connect with the Trans-Siberian.

The Central Basins and Delta of the Yangtze have mild winters as well as hot summers, and a greater rainfall. This is the most fertile and densely populated part of China. Wheat and rice are staple food crops; much cotton is grown. Tea is another crop of importance, and silk is produced towards

the south. This region extends as far as the great gorge of the Yangtze. Near the mouth of the Yangtze lies *Shanghai*, the greatest port and one of the largest cities of China. The other towns of the region are mostly river ports, which collect and send away the products of the surrounding region. The principal are *I-chang*, *Hankow*, *Nanking* (capital 1928–1949), *Chinkiang*, and *Hangchow*. *Hankow* is probably the largest

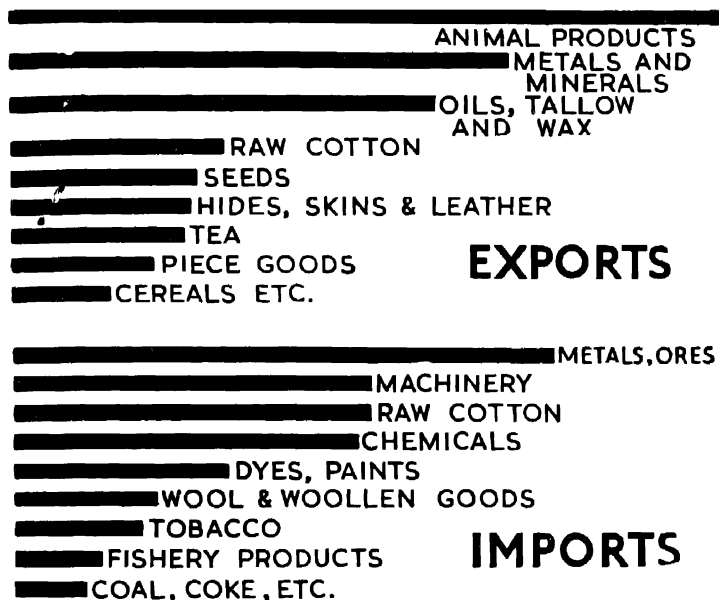


FIG. As.46.—The trade of China before the Second World War—Principal articles.

This diagram is on the same scale as the similar ones for India, Japan, and Singapore. Since China became Communist foreign trade has almost ceased.

town in China; it is really one of a group called collectively *Wuhan*. The river is the great highway.

The **Red Basin, or Upper Valley of the Yangtze**, lies above the great gorge. It forms the province of *Szechwan*, and is one of the great silk regions of China. *Chungking* is the chief city.

The **Valley of the Si Kiang** has a climate rather like that of north-eastern India—warm winters and hot summers and a plentiful rainfall. Rice is everywhere the staple crop, but the

valley is smaller and narrower than the others. Near the mouth of the river is *Canton*, the great outlet of Southern China, and the British port of *Hong Kong*.

The South-East Coast is mountainous, but the narrow valleys are sheltered from the cold winter winds. Tea, silk, and cotton are produced. The principal ports are *Foochow*, *Amoy*, and *Swatow*.

The Mountainous West. Many of the valuable minerals come from the mountainous west, and there are vast deposits still untouched. In the west of China there is also the plateau of Yunnan. It was in this area of the heart of the country that China resisted the Japanese invader and for several years the capital was at Chungking.

Communications in China. The rivers are still the great highways of trade, and more railways and especially roads are badly needed. Peking is the centre of the railway system, but was not linked with Southern China until 1936. Study the railway map carefully. The railways in China were built largely as a result of Japanese, British, and Russian activity.

The Trade of China. Although China is such a large country, it has never had a very large foreign trade. Until about a hundred years ago China would have nothing to do with foreigners, and for years afterwards only certain ports ("Treaty Ports") were open to foreign ships. Much of the trade was in the hands of foreigners—Japanese, British, American and French. Now there is very little.

MONGOLIA

Mongolia is a vast area in the centre of Asia, two-thirds the size of the whole United States but with only a fiftieth of the people. It consists largely of the great desert of Gobi or Shamo, and stretches from the mountains of the frontier of Siberia to China. The people, the Mongols, are nomads, wandering about with their flocks of camels, horses, and sheep, but the use of motors has opened up the country. Settlers from China have cultivated some of the border tracts near China and this part, known as Inner Mongolia, really forms

part of China. In 1924 most of the remainder, known as Outer Mongolia, became a republic allied to Russia. The smaller republic of Tannu-Tuva (now in the U.S.S.R.) had been formed earlier. Some parts of Mongolia are known to be rich in minerals. The principal trading centre is *Urga*, which is now reached by motor-cars from *Kalgan* (now called Wanchuan). The other chief centre is *Kiakhta* on the Siberian border. Wool, skins, and furs are exported.

TIBET AND SINKIANG

Tibet occupies the great plateau of Tibet, the bleak, barren region which has already been mentioned. About 2,000,000 people are believed to live in the region; they are divided into lamas, or monks, and the lay people. The head of government was the Dalai-Lama, who lived at *Lhasa*. For a very long time foreigners have been prevented from entering the country, and large parts are still unexplored. Within recent years, the country has come under the control of the Chinese Communists and there is a motor road to Lhasa.

North of Tibet lies *Sinkiang*, including Chinese Turkistan formerly a province of the outer territories of China, now also under the Communists. The two principal towns are *Kashgar* and *Yarkand*. About these two towns the land is irrigated and a lively commerce, mostly local, carried on.

HONG KONG

Near the mouth of the Canton, or West River, lies the small island of Hong Kong, which has been a British possession since 1841. The island is separated from the mainland by a strait only half a mile wide, and on the shore of the mainland is Kowloon, part of the colony. A considerable piece of the mainland has also been leased to Great Britain. The strait between the island and the mainland forms a wonderful harbour, and Hong Kong is visited by 50,000 vessels yearly.

Hong Kong is a free port, there are no customs duties, and much of the trade of South China used to pass through Hong Kong. The trade of Hong Kong in normal years is as large as that of the whole of the Dominion of New Zealand. The rich Chinese merchants are safer there under British rule than in China, and about $2\frac{1}{2}$ million Chinese live on the island or in Kowloon. There are also shipbuilding yards, sugar factories, and many small industrial works.

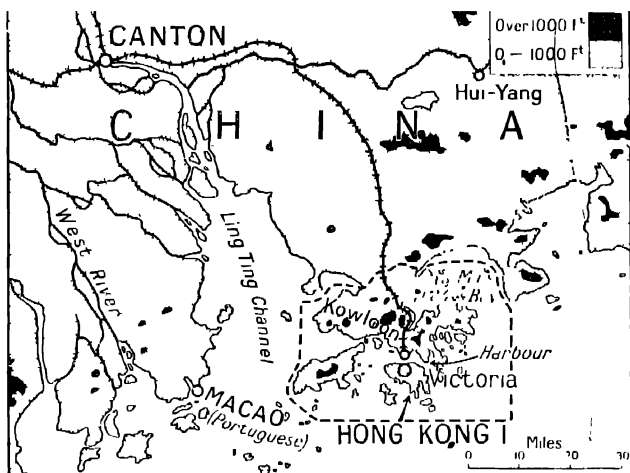


FIG. As.47.—The position of Hong Kong.

MANCHURIA

Manchuria is a large territory, three times the size of the whole of the British Isles, that lies to the north of China and Korea. In the Middle Ages the country was inhabited by wandering tribes of Manchus. Some of these Manchus were very fierce and warlike, and they conquered the whole of China. Making their capital at Peking, the Manchu dynasty ruled the Chinese Empire for many hundreds of years until the Empire came to an end in 1912. Thus it was that Manchuria, the land of the conquerors, became united with China Proper. But there is no longer a Manchu population in Manchuria. A few scattered communities alone remain.

The 40,000,000 people in the country are mainly Chinese and so the Chinese claim Manchuria as part of China. But other countries have been interested in Manchuria. Russia built railways in the north and the town of Harbin in the north and wanted Manchuria because it afforded an ice-free outlet to the Pacific. But Japan defeated Russia in the War of 1905 and Japan began developing Manchuria especially by building the South Manchurian Railway. The people of the small, crowded and mountainous islands of Japan would starve if they could not get food supplies from abroad, and it was the food supplies from Manchuria that Japan needed very badly together with coal, iron, and other minerals. But the Japanese were not content with developing the country; in 1931 they invaded and occupied Manchuria and set up a Japanese-controlled State under the name of Manchukuo. On the defeat of Japan in 1945 Manchuria was returned to China though the U.S.S.R. has again a strong influence and holds a right of access to the Yellow Sea.

The chief towns are Shenyang, formerly Mukden, with nearly a million people, Kirin, and Pinkiang or Harbin which is linked with the Trans-Siberian Railway. But geographically Manchuria should really be divided into three regions—the eastern and western hills and the central plain. The climate of the plain is not unlike that of the Canadian prairies, with very cold winters, hot summers, and a rainfall mainly in the early summer. There is still plenty of room for more people and there are vast opportunities for development, and Manchuria is rapidly becoming one of the world's great granaries. Millet and wheat are the great food crops, together with beans, the latter grown largely for export. Perhaps we cannot realise how important the beans—soya beans—can be; but they yield a valuable oil which can be used in cooking and in the manufacture of soaps, margarine, and a very large variety of foodstuffs, whilst the beans from which the oil has been crushed out give a valuable cattle cake. So bean cake, beans and bean oil form more than half of all the exports of Manchuria. The other products exported are wheat, other cereals, coal and timber. Before the war about two-thirds of all the exports went

to Japan. Every year large numbers of Chinese immigrant arrive in Manchuria from the over-populated parts of China. Although the Japanese spent much money in developing the country, by building railways, roads, hospitals, towns, working mines, etc., there were never many Japanese settlers because the Japanese did not like the hard climatic conditions. The Japanese-built South Manchuria Railway has done for Manchuria largely what the Canadian Pacific Railway did for Canada in opening up the country. There are other railways, and altogether the length of lines is about 5,000 miles, so it is wrong to think of Manchuria as a wild undeveloped country. The South Manchuria Railway runs into the Kwang-tung Peninsula with the ports of Port Arthur and Dairen, which are the natural outlets of the country situated on the Peninsula of Liaoning (see Fig. As.45). Dairen was made into a large city by the Japanese.

JAPAN (NIPPON)

The island kingdom of Japan has often been called the "Britain of the East." Both Britain and Japan are groups of islands in mid-latitudes, lying one to the north-west and the other to the north-east of the great land mass of Eurasia. Japan Proper consists of four large islands forming a long curve from north-east to south-west. In 1941 Japan treacherously attacked the United States Fleet in Pearl Harbour in Hawaii without warning. The Japanese planned thus to cripple the strength of the United States navy and to gain control of all eastern and southern Asia. Initially they met with great success and occupied most of south-eastern Asia as far west as and including Burma, but were defeated finally by Anglo-American forces in 1945. Before the war the Japanese Empire included half the island of Sakhalin in the north, a string of small islands terminating in the large island of Taiwan in the south, and the large Peninsula of Korea on the mainland of Asia. In addition Japan controlled many groups of Pacific Islands. After a period of occupation by American troops, Japan is again an independent country but restricted to the four main islands of Japan Proper and a few small islands.

Position and Size. Japan Proper extends from 30° N. to 45° N. but running through the island of Taiwan (Formosa) E. the Tropic of Cancer, and former Japanese territory in

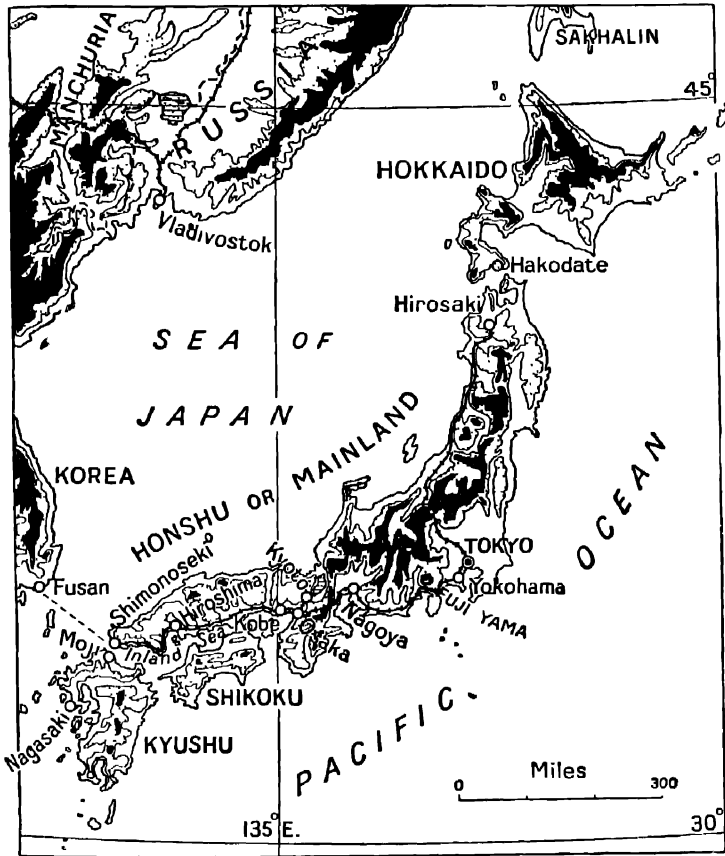


FIG. As.48.—Map of Japan. Land over 1,500 feet dotted; over 3,000 feet, black.

Sakhalin extended to 50° N. The Japanese Empire thus covered a wide latitude. Japan is nearer the equator than are the British Isles; 135° E. runs through the centre of the kingdom. The largest island of Japan (Mainland, or Honshu) is almost exactly the same size as the largest island (Great

Britain) of the British Isles ; but Japan is larger than the British Isles.

Physical Features. Nearly all parts of Japan are mountainous, and although the mountains are irregularly arranged they tend to form two great curved ranges, separated by a midland valley. There are numerous volcanoes, of which the most famous is Fuji Yama (Mount Fuji), over 12,000 feet high. It is a sacred mountain to the Japanese. Many other peaks

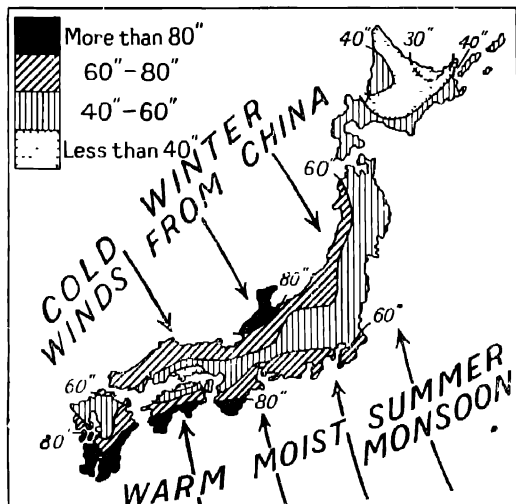


FIG. AS.49.—The annual rainfall and winds of Japan; the rainfall (actually snowfall) on the north coast comes mainly in the winter, on the south coast mainly in the summer.

rise to over 7,000 feet. Compare this with Great Britain, where the highest mountain is 4,400 feet. The only extensive plain is around Tokyo. The four main islands of Japan are Hokkaido in the north, Mainland or Honshu (the largest), Shikoku, and Kyushu. Notice carefully the position of Shikoku and Kyushu.

Between them and Honshu is the famous Inland Sea of Japan, which is like a huge sheltered harbour, very beautiful and very valuable to shipping. It is really part of the midland valley, drowned by the sea. In common with many mountainous countries, Japan suffers very badly from earthquakes. In September, 1923, one of the most disastrous earthquakes in the history of the world entirely destroyed the great port of Yokohama and a great part of the capital, Tokyo.

Climate. The climate of Japan is greatly affected by ocean

nts (see Fig. As.4). Notice how the warm Kuro Siwo, Japan Current, splits into two branches, one on each side of Japan. Then there are two cold currents also. Notice why the west coast is a little warmer than the east. Japan is often compared with England as regards climate, but it is more like New England. In the cold season the northern half of Japan is below freezing—much colder than Scotland, but in the hot season (July) Southern Japan is as hot as the coastlands of Spain. The extremes are much less than in China, because of the influence of the sea all round, but there is certainly a big variation. The north-western side of the islands gets most of its moisture in the cold season, when winds are blowing across the sea from the mainland of Asia. Snow is more important than rain. But the south-eastern side gets a heavier rainfall in the warm season when the summer monsoon is blowing. This monsoon in Japan blows from the south-east, and is part of the great monsoon system of Asia. But the winds are not nearly as strong as the South-West Monsoon winds in most parts of India.

Vegetation and Crops. Japan is a mountainous country, and the hilly parts, which cannot be used for cultivation, are usually forested. In the north the forests are of coniferous trees usually mixed with some deciduous; in the south broad-leaved trees are more abundant. The forests are a valuable source of soft timber and are carefully looked after. They cover nearly half of Japan. But 90,000,000 people live in Japan, and every available piece of land is used for crops. Often villages are built on steep hillsides and the hill is cut into tiny fields. Three-quarters of the arable land is worked by peasants. Moreover, intensive cultivation is practised. The principal food grain is rice, which covers 55 per cent of the cropped land. Quick maturing varieties are now grown even in the north; in the south two and even three crops a year are possible. Wheat, barley, and rye (rye in the cold north) together cover much land. Other important crops are sweet potatoes, vegetables, tea, and tobacco. Japanese tea is "green tea" and is different from that of India or Ceylon; some is exported to the United States. A considerable number of

cattle are kept, but Japan is so fully cultivated that there is little land left for sheep or goats. Large numbers of mulberry trees are grown for the sake of the silkworms, for the production of silk is a very important industry. The silkworms are reared by the same farmer who farms wheat, an interesting example of mixed farming. Japan produces a large part of the silk of the world.

Population. The Japanese are among the most progressive and clever of all the Mongolian peoples. They have adopted and sometimes improved on the great inventions of western nations. They became a first-class power, with the third largest navy in the world, and all the men who were physically fit were trained either in the army or navy. Then they became aggressive and so suffered defeat.

The indented character of the coast-line had the same effect as in England. The Japanese are a seafaring people and have large numbers of merchant ships. The Japanese became, especially between the two World Wars, an industrial nation and engaged in manufactures of all kinds. There are six large industrial cities, quite like the manufacturing towns of Europe or America, and very different from the quaint old country towns and villages.

Mining. Japan has several coalfields, and produces 40 to 50,000,000 tons of coal, but only about one-fifth of that mined in Great Britain. The coalfields are in Kyushu, near Nagasaki, and in Hokkaido. Notice that the coalfields are in the northern island and the southern island of Japan Proper. Japan also has oilfields near the north-west coast of Honshu, but does not produce enough for her own use—only about 1/400th of the quantity produced in the United States. There are valuable copper deposits, but less important are gold, silver, iron, and sulphur. Japan is poor in iron ores.

Fishing is an important occupation of the Japanese, for fish is the chief animal food in their diet. They have also invented a clever process whereby oysters are made to form natural pearls, and large numbers of these "culture pearls" are obtained.

Manufactures and Trade. The principal industries are the manufacture of cotton, silk, rayon and woollen goods, paper,

ceramics, glass, and matches. Japan specialises in cheap cotton and silk goods, as well as cheap toys, matches, etc., but the quality is usually below that of other countries. The industrial revolution in Japan occurred mainly after the China-Japan War of 1894-5. The growth of factories was extremely rapid, especially during and after the First World War. The Japanese standard of life is much lower than that of the industrial nations of western Europe and North America,

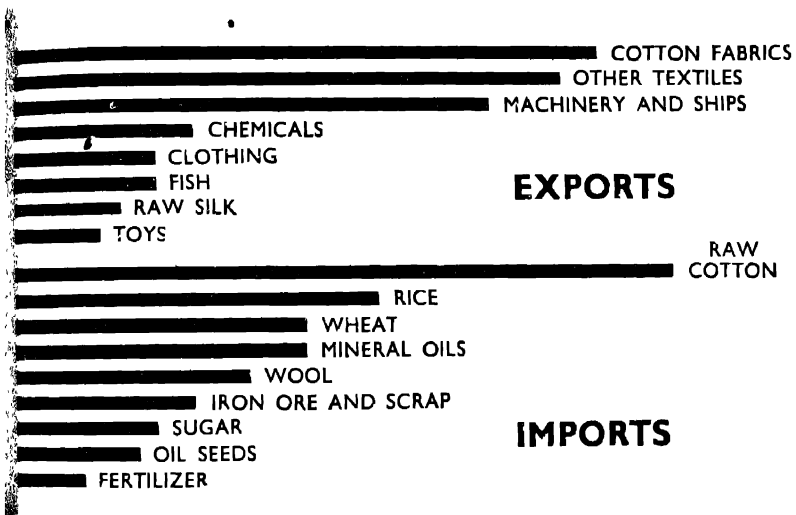


FIG. As.50.—The trade of Japan 1954. Principal articles.

and so, as they worked for lower wages, they could export their goods very cheaply indeed. Just like Great Britain, Japan has to import much of the raw material for her industries especially cotton (from the United States and India), wool (from Australia), and iron. Japan has not nearly enough iron, and so imports iron and machinery. She cannot grow enough food for her people, and so buys rice, as well as peas, beans, and sugar. The most valuable exports are cotton goods, raw silk, silk goods and rayon or artificial silk, glassware and

earthenware, tea, matches and timber, and refined sugar. Japan exports coal from Nagasaki and Hakodate, but imports it at other ports.

Cities. *Tokyo*, the capital, now claims to be the world's greatest city, with eight million people. It was partly destroyed by the earthquake in 1923. It is a busy manufacturing centre. *Osaka* is the principal manufacturing city of Japan, and is also a port. It has over 2,500,000 people. *Kyoto* is the old capital of Japan, and a fine historic city. It has, however, moved with the times and developed numerous manufactures and has over a million people. *Yokohama* is the largest port of Japan; it is not only the port of Tokyo, but has large manufactures of its own. It was entirely destroyed by the earthquake and fire of 1923, and most of the merchants moved to Kobe or Osaka. They have now returned and the city has regained its old importance. *Kobe* is the second port of Japan. It is close to Osaka, and the whole forms one great manufacturing district. *Nagoya* is an inland centre. These six cities have each over a million people and are different from all the other towns and cities of Japan. They are modern cities, like those of Europe or America, with huge factories and office buildings.

Nagasaki is a coal port and the principal town on Kyushu.

Hiroshima is a large port on the Inland Sea largely destroyed towards the end of the Second World War in 1945 by the dropping of the first atom bomb. It was about a third the size of Yokohama. *Moji* and *Shimonoseki* are twin ports at the western entrance to the Inland Sea associated with heavy industry. It is from here that boats go across to Korea. *Hakodate* is the principal town and port of Hokkaido.

Railways. Japan is well served by railways of narrow (3 ft. 6 ins.) gauge, partly electrified and with very fast trains. One of the most important lines runs through the country and connects the principal towns—from Shimonoseki to Hiroshima, Kobe, Osaka, Kyoto, Nagoya, Yokohama, and Tokyo. The direction of many of the railways is controlled by the mountainous nature of the country. Roads are still poorly developed.

KOREA, OR CHOSEN

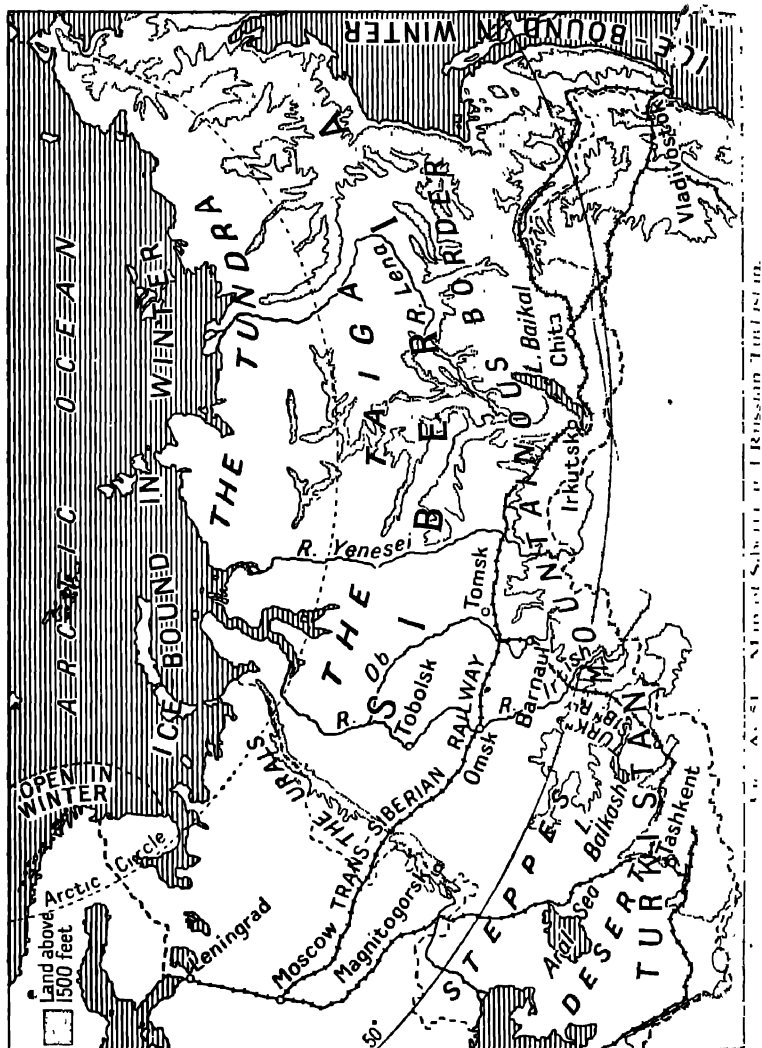
This is a large mountainous peninsula. After the war between China and Japan in 1895, it became independent, but in 1910 it was annexed to the Japanese Empire. The inhabitants, Koreans, number 32,000,000. Korea is an agricultural country and grows more rice, barley, peas, and beans than the people need, and so was able to export some to Japan, which needs these foods. Korea is rich in minerals, including iron ore, which is also badly needed by Japan. The country is still largely undeveloped. The principal town is *Seoul*; whilst the port of *Pusan* is only about 120 miles from Shimonoski, in Japan. After the defeat of Japan in 1945 war broke out between North Korea, aided by Communist forces, and South Korea assisted by the United Nations. Although an armistice was signed in 1953 the country remains divided.

FORMOSA, OR TAIWAN

This land became part of the Japanese Empire after the China-Japan War in 1895 but was returned to China in 1945. It was developed by Japan, mining and agriculture becoming important. It produces and exports camphor, tea, sugar, and coal. The island is little more than half the size of Ireland. When the Chinese Communists gained control of the mainland it became the retreat of the Nationalists.

ASIATIC RUSSIA (SOVIET ASIA)

The name Siberia is generally taken to mean that part of Russia in Asia which covers roughly the same area as the lowland triangle of North-Western Asia. We have learnt that this is a great lowland area, drained mainly by the Ob, Yenesei, and Lena Rivers, which flow into the Arctic Ocean. The mouths of these rivers are frozen for a great part of the year, even during the time that their middle courses farther south are not frozen. As a result, the water cannot get out at the mouths and spreads over large areas, forming enormous marshes. In the north is the Tundra, a frozen waste for part of the year and a great marsh for the other. South of the broad belt of the almost useless Tundra lies the belt of Coniferous Forests—the Taiga, which in places is very marshy.



To the east the forest belt stretches to the foot of the mountains of Mongolia, but to the south-west the forest passes gradually into grassland. The belt of grassland with scattered

the most fertile part of Siberia. The soil is rich like the "black earth" of Russia, and excellent for wheat cultivation. Farther south the land gets drier and passes into steppe—poor grassland—and gradually into desert.

These, then, are the natural regions of Siberia:

- (1) The Tundra.
- (2) The Taiga, or Coniferous Forest Belt.
- (3) The Fertile Grove Belt.
- (4) The Steppe.
- (5) The Desert.
- (6) The Mountainous Border.

All over Siberia the rainfall is low—never more than 20 inches. The parts near the Tropics (in Turkistan) which have less than 20 inches of rainfall are often desert, but in the colder north in Siberia, crops will grow with less rain, because the snow does not dry up the ground so quickly.

(1) **The Tundra** is almost uninhabited apart from small nomadic groups of Samoyeds but experimental towns have been developed by the Russians.

(2) **The Taiga** is little used; in parts the trees would give fine timber, but in the marshy parts the trees are rotten. A growing industry in this region is fishing and in recent years a number of river ports, handling fish and timber, have been established. *Igarka* on the lower Yenesei is one of the most important.

(3) **The Grove Belt, or Rich Steppe** with trees, has most of the people of Siberia, and is the most developed region. In addition to wheat cultivation, large numbers of cattle are reared, and the manufacture of butter is important, especially in the rich valleys near *Kurgan*, *Omsk*, and *Barnaul*. Rapid progress has been made in recent years in the development of coalfields, especially the Kuznetsk Basin, with the result that *Omsk*, *Novo-Sibirsk*, and *Barnaul* have become great manufacturing towns. When the Germans invaded and overran a large part of European Russia much of the industry of the country was moved to these towns.

(4) **The Steppe**, until recently, was little developed being inhabited by wandering tribes with herds of horses, camels,

cattle, and sheep. However, important mineral resources are now being worked and large collective or state-owned farms established.

(5) **The Desert** stretches southwards from the steppe land to the mountains of Persia. For a narrow strip along the foot of the mountains irrigation by means of short streams from the mountains has been carried out, and much cotton is grown. This is particularly the case in Russian Turkistan where there are important towns such as Tashkent with over half a million people, Bokhara, and Samarkand. Turkistan and the neighbouring regions constitute what is now called Soviet Central Asia and consist of several Soviet republics which are members of the U.S.S.R.

(6) **The Mountainous Border.** Right from Russian Turkistan to the extreme north-east is a strip of mountainous country where the land borders on the plateau regions of the heart of Asia. Mining is important, especially for gold in the Lena Basin. Many of the hills between the valleys are fertile and cattle are reared. This belt includes the mountainous country around Lake Baikal and the borders of the Pacific Ocean.

Communications. In the north the rivers of Siberia—the Ob, Yenesei, and Lena—are navigable for great distances and are important for local use and for floating timber, but their lower and middle courses are frozen in the winter.

Running from east to west right across Siberia is the Trans-Siberian Railway. It runs to the south of the coniferous forests and the marshes, and in the fertile belt through Omsk. Farther east the railway enters the mountains and skirts Lake Baikal, and runs thence to Vladivostok. Follow its course carefully on the map (Fig. As.51).

In South-Western Siberia there is another important railway running from the Caspian Sea along the foot of the Persian mountains (through the irrigated area) to the mining districts of Turkistan. Another line runs from Turkistan direct to Moscow in Europe and enables the raw cotton from the warm valleys to be sent to the textile mills of European Russia. At great difficulty and expense, the Russians built the Turk-Sib Railway to link Turkistan and Siberia.

SOUTH-WESTERN ASIA

In the section dealing with the physical features of Asia, we learnt that running westwards from the Pamir Knot there were two great mountain chains, enclosing between them a series of

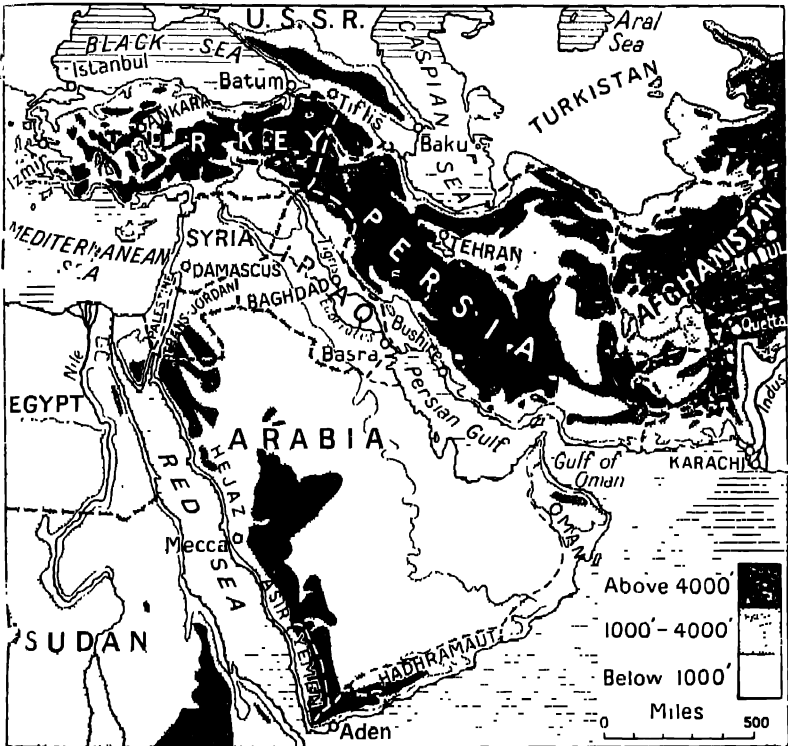


FIG. As.52.—South-Western Asia.

plateaus. The countries which occupy this area of mountains and plateaus are, from east to west, Afghanistan, Iran or Persia, and Turkey. To the north of this area of mountains are lowlands, viz. the deserts of Soviet Central Asia, the Caspian Sea and surrounding lowlands, and the Black Sea. To the south are lowlands or seas—the Indus Valley, Persian

Gulf, Iraq or the Tigris-Euphrates basin, Syria, and part of the Mediterranean Sea.

Study the map, Fig. As.52, carefully before you read any farther.

TURKEY

Asia Minor is the only part now remaining of the once huge Turkish Empire in Asia. Turkey also possesses the territory in Europe round the old capital of Constantinople now called Istanbul or Stamboul. Notice that Turkey thus controls the narrow straits of the Dardanelles and Bosphorus which are the key to the Black Sea. Asia Minor extends from the Ægean Sea on the east to the Armenian Knot in the west. It can be divided into two parts:

- (a) The Plateau.
- (b) The Coastlands.

(a) **The Plateau** is dry and largely covered with poor grass. Formerly some of the people were semi-nomads keeping herds of sheep and goats especially the famous Angora goat from which mohair is obtained. Now agriculture is important, especially where irrigation is possible and such crops as wheat can be grown. There has been an important growth of mining and manufacturing in many of the towns. In the heart of the plateau lies *Ankara*, or *Angora*, now the capital of Turkey.

(b) **The Coastlands** border the Mediterranean Sea and the Ægean Sea. There are valleys sheltered by ranges of hills in which the soil is often fertile and the climate is Mediterranean, so that fruits such as the grape, olive, and fig are grown. Wheat, barley, and a little cotton are also produced. There is also a coastal strip along the Black Sea which is damper and largely covered with forest, from which hazel nuts are exported. On the west coast and amongst the Ægean Islands sponge fishing is an important industry. The principal coast-town of Asia Minor is *Izmir* or *Smyrna*. Remember that the mountain ranges run east to west, so that Izmir on the west coast commands easy valley routes on to the plateau. It exports large quantities of figs and sultanias.

The republics of Armenia, Georgia, and Azerbaijan were formed after the First World War, but did not remain independent for long, and now form part of the Soviet Union as described under Europe. Armenia occupies the knot of mountains known as the Armenian Knot. Between the Armenian Knot and the Caucasus Mountains lies the region known as Trans-Caucasia. *Baku*, in Azerbaijan, has some famous oilfields, and the oil is sent by railway to *Batum* on the Black Sea. Notice how this railway runs through the valley lands of Azerbaijan and Georgia. *Tbilisi* or *Tiflis*, the principal town of Georgia, lies on this route.

IRAN OR PERSIA *

Persia is a large country, but has only about fourteen people to the square mile, since a very great part is covered by deserts and high mountain ranges. We can divide the country into three parts:

- (a) The Northern Lowland Strip.
- (b) The Central Plateau and Mountains.
- (c) The Southern Lowland Strip.

(a) **The Northern Lowland Strip** lies along the shores of the Caspian Sea; the rainfall is heavier than in other parts of Persia, and the soil is good. Rice, sugar, and cotton can be grown, but the strip along the coast is fever-ridden and so was avoided by settlements. The slopes of the hills are forested, and the towns are built at the foot of the slopes. Above the forest, pasture land is found.

(b) **The Central Plateau and Mountains** occupy most of the country. Surrounded by a ring of mountains (see Fig. As.52) is a great salt desert, and any rain drains into an inland lake. The winters are cold and the summers are hot; the little rain which does fall comes in the winter, so that Persia really has a very dry type of Mediterranean climate. Most of the inhabitants live in oases in the desert where grain, cotton, tobacco, and opium can be grown, or in the more fertile valleys amongst the mountains. In the mountains the people

* This country has long been known in English as Persia but the Government declared that the official name should be Iran.

keep herds of sheep, goats, horses, and cattle, and wander about from place to place. The most fertile valleys, where grain can be grown, are in the north-west. The capital of Persia, *Tehran* or *Teheran*, is in this region whilst *Tabriz* lies amongst the mountains to the north-west.

Towards the south lies one of the greatest oilfields in the world—at Maidan-i-Sulaiman. It was developed by the Anglo-Iranian Oil Company—a British Company which paid a royalty to the Persian government and did a remarkable work in building roads and towns. The oil was sent by pipeline to refineries on the coast on the island of Abadan. In 1951 the Government nationalised the oil industry but were unable to carry on the work of production. It is now being worked by an international group in which Britain has a large share.

(c) **The Southern Strip** bordering the plains of Mesopotamia, Persian Gulf, and Gulf of Oman is a dry, dusty region. The towns along this coast, *Khorranshahr*, *Bushire*, and *Bandar Abbas*, serve as ports for the interior.

In recent years many notable roads have done much to open up the country and there is now a railway from the Caspian to the Persian Gulf. Persia has long been famous for its carpets.

AFGHANISTAN

The eastern part of the great plateau belongs to Afghanistan. Most of the country is over 4,000 feet high, and many of the mountain ranges rise to 15,000 feet and more, and so the climate is cold. The capital, *Kabul*, is liable to snow for several months of the year, but the summers are hot and dry. The Afghan people are mainly nomads and their wealth lies in their flocks of sheep, goats, etc. Agriculture, where practicable, is carried on by the help of irrigation. Afghanistan occupies an important position on the mountain wall which separates India from Asiatic Russia.

IRAQ

In the section on the “Physical Features of Asia” we spoke about the great river basins which separate the folded mountains of the centre of Asia from the old plateaus of the south.

One of these flat river basins is that of the Tigris and Euphrates, and the country covering this basin is the country of Iraq. Just like the fertile plains of the Ganges, this has been the home of some of the great civilisations of the world. The great empires of Babylonia (with its centre at Babylon on the Euphrates) and Assyria (with its centre at Nineveh on the Tigris) flourished thousands of years ago. In that distant past this was a land covered with crops maintained by a careful and elaborate system of irrigation. The cities were rich and prosperous, and boasted men who became famous as builders of great brick cities, as sculptors, and as scholars.

With the coming of Turkish rule the cities fell into decay, and the irrigation works were destroyed, leaving the country a barren waste. The most important part of the country is the land between the two great rivers Tigris and Euphrates and this is the area called Mesopotamia. After the First World War the country was at first under the protection of Great Britain, but in 1932 became an independent Arab kingdom. Iraq includes a large area of desert on the south and stretches to the mountains on the north. The rainfall is only about 5 or 10 inches and falls in the cool winter. The hot summers are dry, so that Mesopotamia really has a dry Mediterranean climate. The upper part of the basin is slightly undulating, and the two rivers are fed by the snows from the mountains of the Armenian Knot. In their lower courses the rivers overflow their banks and give rise to dreary and unhealthy marshes. But gradually they are being controlled and the water used for irrigation so that there are fields of cotton, wheat, millet, sesame, maize, and tobacco. Along the lower reaches of the river are huge groups of date palms and half the dates in the world are grown in Iraq.

Three towns of importance in Iraq are Mosul, Baghdad, and Basra. *Mosul* is on the Tigris, near the site of the ancient Nineveh and at the head of navigation of the Tigris. It is in such a position as to control the trade route of Upper Mesopotamia. *Baghdad* is situated on the Tigris, but at a point where the two rivers approach one another very closely. Near by, but on the Euphrates, is the site of Babylon. *Basra*

is the chief port of Iraq, situated on the combined ~~Delta~~ and accessible to ocean steamers and now a great air port. In recent years Iraq has become a big producer of mineral oil, especially from Kirkuk, near the Persian border. Since 1940 the railways of Iraq have been linked with those of Turkey so that through-connection is possible from Europe to Basra. In July 1958 the young King of Iraq was assassinated and the country became a Republic.

ARABIA

Arabia occupies the great plateau in the south-west of Asia. The plateau slopes, as suggested in Fig. As.52, towards the Persian Gulf and the plains of Iraq in the north-east. Because of the dry climate, there are no permanent rivers; the surface of the plateau is not cut by deep river valleys but by broad shallow *wadis*. Arabia is actually a very large area, one-third the size of the whole of the United States. Although Arabia lies in the hot desert tract (notice the reason for this) not all the country is really and truly a desert. The Arabs, indeed, call their country the "Isle of the Arabs." The great plateau is not, of course, an island, although it is bounded by the Red Sea on the west, the Indian Ocean or the Arabian Sea on the south, and the Persian Gulf on the east; but it does resemble an island, because on the north it is cut off from the fertile countries of Palestine and Syria by a desert—the Syrian Desert. In the heart of the country there are great oases—often tracts large enough to have hundreds of thousands of people living there and cultivating the soil—although they are cut off from the outside world by wide strips of desert. The oases are found where underground supplies of water are available. They form important parts of the country, and are inhabited by a settled population. There are some Arabs also who do not live settled lives, but wander about for most of their existence, and with the help of camels ("the ships of the desert"), donkeys, and asses, act as carriers of goods. There are also more fertile areas along the coasts. The most important of these lies in the south-western corner—a part of the country which used to be called *Arabia Felix*, or Happy Arabia. The mountains here are high and get some of

the winds from the Indian Ocean, so that the moisture is enough to enable crops to be grown. Here one of the most famous types of coffee in the world, Mocha coffee, is grown, though only in small quantities. Farther north, not very far from the Red Sea coast, is the famous city of *Mecca*. Mecca lies in a desert region, but it is the desire of all true Mahomedans, if they possibly can, to make a pilgrimage to Mecca and visit the sacred city before they die. Thousands go every year, most of them landing at the port of *Jidda* on the Red Sea. The largest town is the progressive *Riyadh* in the heart of the country. •

On the Arabian Sea coast is the British coaling and oiling station and naval base of Aden with a huge oil refinery.

Most of Arabia now forms the Arab Kingdom of Saudi Arabia, but there are independent Sultanates and Principalities along the Persian Gulf and Arabian Sea (Kuwait, Bahrain, Muscat and Oman, Yemen, and others). Since the discovery of oil in 1932 the whole fortunes of the Persian Gulf littoral have changed. It is probably the world's richest oil-bearing region.

SYRIA AND LEBANON

Before the First World War, Syria, like Palestine, was part of the old Turkish Empire. After that war it was placed under the protection of France. Later the independent republics of Syria (mainly Moslem) and Lebanon (with many Christians) were established. The Lebanese Republic (capital Beirut) stretches along the Mediterranean Sea, the Republic of Syria (capital Damascus) occupies the rest. The whole has belts of hills which run from north to south along the coast and so intercept the rain-bearing winds which blow from the Mediterranean. Thus the coastal tracts have quite a good rainfall and grow Mediterranean crops, including fine oranges and tobacco. Behind the coastal hill belt there is a broad valley and then a plateau; eastwards the land passes rapidly into desert. Damascus lies on the border of the desert and has wonderful gardens made fertile by using water coming down from the mountains. From Damascus regular motor services run right across the desert to Baghdad. In the north of Syria is the famous old town of *Aleppo*. The principal port (in Lebanon) is *Beirut*. In 1958 Syria joined Egypt as the United Arab Republic.

ISRAEL AND JORDAN

The old Holy Land, or Palestine, occupied an area only a little larger than Wales—about 9,000 square miles. In the days of long ago before Jesus Christ was on the earth, it was the Promised Land of the Jews, and so after its capture from the Turks in 1917–18, a plan was put into operation to make Palestine a national home for the Jews, and large numbers have since immigrated there. Palestine is also a sacred country for Christians, for here is Bethlehem, the birthplace of Jesus Christ, as well as such famous places as Jerusalem, Nazareth and the Sea of Galilee. There are also large numbers of Arabs who have settled down to a farming or a town life living in Palestine, just as there are in Syria. Syrians are in fact Arabs who have settled down and no longer follow a nomadic life. They are Mahomedans and the great mosque at Jerusalem is one of their very sacred buildings. Thus there are three quite distinct groups of people—the Jews, the Christians, and the Mahomedan Arabs. This made it very difficult to make Palestine a State controlled by Jews. After the First World War, the country was controlled by Britain under mandate for the League of Nations. Britain gave up the mandate in 1948 and the Jews set up the republic of Israel, covering the Jewish parts of the country, whilst the Arabs of the Kingdom of Jordan took over the remainder.

Palestine may be divided into four strips. The land along the coast is a fertile Mediterranean country producing the famous Jaffa oranges and various Mediterranean fruits, such as grape fruit. Then there is the hill belt on which Nazareth and Jerusalem are built, and which is quite cold in the winter and may even have snow. Much of the land here is rather dry and barren, but there are numerous olive groves. Then there is the remarkable, deep valley occupied by the River Jordan and the Dead Sea. Here again the climate is much warmer, for the Dead Sea lies over a thousand feet below sea-level. To the east of the Jordan Valley there is the country of Trans-Jordan. The chief ports of Palestine are *Haifa* and *Jaffa*. There has been a very large immigration of Jews into Israel

—nearly 2,000,000—and Haifa has become a large city and port. An oil pipeline was built from the oilfields of Iraq to both Haifa and Tripoli, but owing to the continued disputes between Israel and the Arab states no oil flows to Haifa. Close to Jaffa, the Jews have built a fine new city called *Tel Aviv* with many industries.

The southern half of Israel is a triangular stretch of desert reaching to a point on the Gulf of Akaba which gives the Jews an outlet to the Red Sea. They have worked very hard to irrigate and develop parts of this desert land.

The Hashemite Kingdom of the Jordan is a separate independent Arab kingdom with *Amman* as its chief town. Formerly limited to Transjordan, the arid country east of the Jordan, it now controls the Arab parts of the former Palestine, including the old walled part of Jerusalem. The newer parts of Jerusalem, lying to the west, are in Israel.

CYPRUS

The island of Cyprus, about half the size of Wales, lies in the eastern Mediterranean about 40 miles south of Turkey. Until 1878 when it passed under the control of Britain it was a Turkish possession and about one fifth of its people are Turkish-speaking Mohammedans. Most of the remainder are Greek-speaking Christians, but the two groups agreed in 1959 to work together to establish a republic, a plan approved by Britain. The island produces Mediterranean fruits and wine and has important mineral resources, especially copper. The beautiful sunny spring, the varied scenery including snow-capped mountains, and fine old walled cities combine to make the island attractive to tourists. The capital is *Nicosia*, chief ports are Famagusta and Limassol. •

TRADE ROUTES OF SOUTH-WESTERN ASIA

The part of Asia we have been studying lies between Europe and India, and from earliest times the trade routes in this part of Asia have been of great importance. Owing to the large

areas of desert and high mountains, there are only a few possible lines for trade routes. Study Fig. As.53 carefully.

Long ago two of the most civilised and important countries in the world were Egypt (or the valley of the Nile) and Mesopotamia (or the valleys of the Tigris and Euphrates), the latter country forming the Empires of Babylon and Assyria. There is only one route between the two countries which avoids the desert. This route passes through Palestine and Syria, through Damascus to the upper part of the Fuphrates. Note how

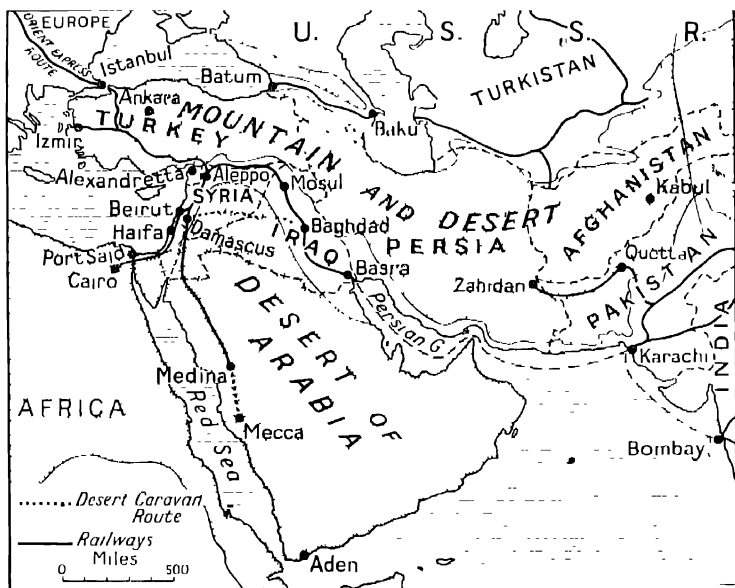


FIG. As.53.—Trade routes of South-Western Asia.

Notice the key position of Aleppo between the desert and the mountains. There is a motor service across the desert between Damascus and Baghdad, and there are many regular air services such as that from London *via* Malta, Cairo, Basra, to Karachi (Pakistan).

important Palestine was. For long it formed a buffer state between the powers of Egypt and Babylon or Assyria.

In modern times, amongst the world trade routes one of the most important is between Europe and India. Most of the trade passes through the Suez Canal, which has now been taken over by the Egyptian Government (See p. 564). Before the First World War Germany tried to gain control of a great land

route which should connect Europe and India. The Baghdad railway was planned to run from Istanbul through Baghdad to the Persian Gulf, and probably to Karachi to join the Indian railways. The main part of this great scheme was in fact completed in 1940 when Iraq built the central section and through trains began running from opposite Istanbul to the Persian Gulf (Basra). In both the old and new routes notice the position of *Aleppo*, where the old caravan routes and the railway come down through the famous pass known as the Cilician Gate from the plateau of Asia Minor to the Mesopotamian Plains. Near by is the Port of Alexandretta in southern Turkey, as well as the old port of Antioch which it has replaced. But the great development of air routes in recent years has reduced the importance of its old position.

QUESTIONS AND EXERCISES

1. Describe and account for the climates of Asia throughout the year.
2. Where are the Monsoon Lands of Asia? How does the climate vary from one part to another?
3. Give an account of the mountain systems of Asia.
4. What do you understand by "festoons" used in a geographical sense? Give examples.
5. What influence has the Himalayan Range had (a) on the climate, (b) on the races and occupations of Asia?
6. Describe the climate of Japan.
7. What are the principal ports of China? Account for their importance.
8. Compare the foreign trade of India with that of China.
9. What railways do you think could be profitably constructed for connecting India with the surrounding countries?
10. Account for the importance of the following ports: Singapore, Colombo, Calcutta, Bombay, Shanghai, Yokohama, Aden.
11. Describe the main routes (land, sea, and air) between Europe and Asia.
12. Write a description of a journey in summer along the Trans-Siberian Railway from Vladivostok to Moscow.
13. Write a description of the physical features, climate, and productions of Indo-China.
14. Write what you know of Java.
15. Draw sketch-maps to show routes between India and China.
16. How do you account for the rapid rise of Japan?

17. Where and what are the following: Fuji Yama, Hakodate, Taiwan, Babylon, the Dead Sea, Yarkand, Dairen, Mecca, Tarim Basin, Red Basin, Tiflis?

18. Compare and contrast the south-east coast of China with the corresponding coast of Spain.

19. What parts of Asia do you consider are over-populated? What outlets are possible for the surplus population?

20. Draw sketch-maps to illustrate the importance of the position of Aden, Hong Kong, Yokohama, Shenyang (Mukden), Peshawar, and Hankow

21. What do you know of the trade between South Africa and the Far East? What extensions do you think are possible in this trade?

22. Compare and contrast China and Japan.

AUSTRALIA AND NEW ZEALAND

POSITION AND SIZE

AUSTRALIA, even including the islands of New Guinea, New Zealand, and Tasmania, and a very large number of islands which lie scattered over the face of the Pacific Ocean, is by far the smallest of the continents. With its 3,000,000 square miles

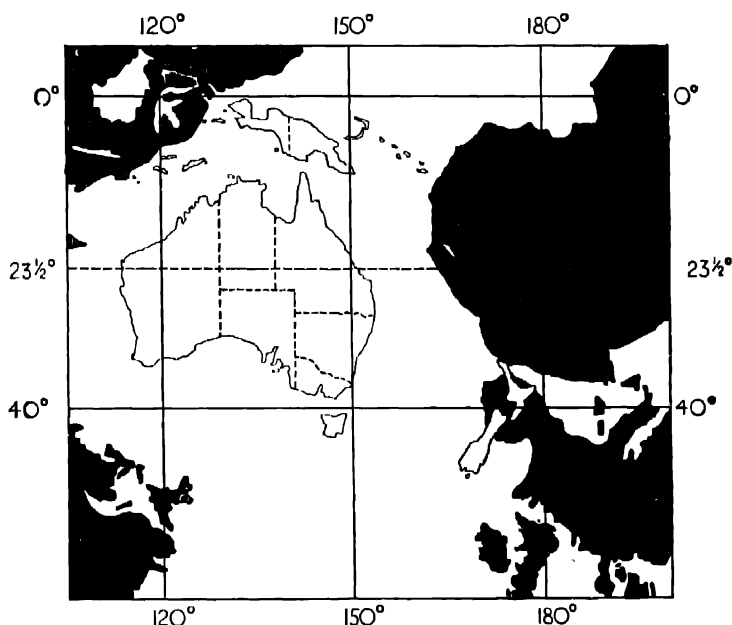


FIG. Au.1.—The position and size of Australasia.

The black areas are the land on the opposite side of the world.

Australia proper—*i.e.* the island continent including Tasmania—compares in size with the United States or Canada. In position, we may note that the Tropic of Capricorn cuts the continent of Australia almost in half, so that the northern half lies in the Tropics and the southern half in the South Temperate Zone. The latitude of 40°S. passes through Bass Strait

between Australia and Tasmania, and also passes through the North Island of New Zealand, just north of Wellington. Longitude 135° E. almost cuts Australia into two halves. Notice the remoteness of Australia and New Zealand from the principal countries of the world. That helps to explain why they remained so long unknown and undeveloped.

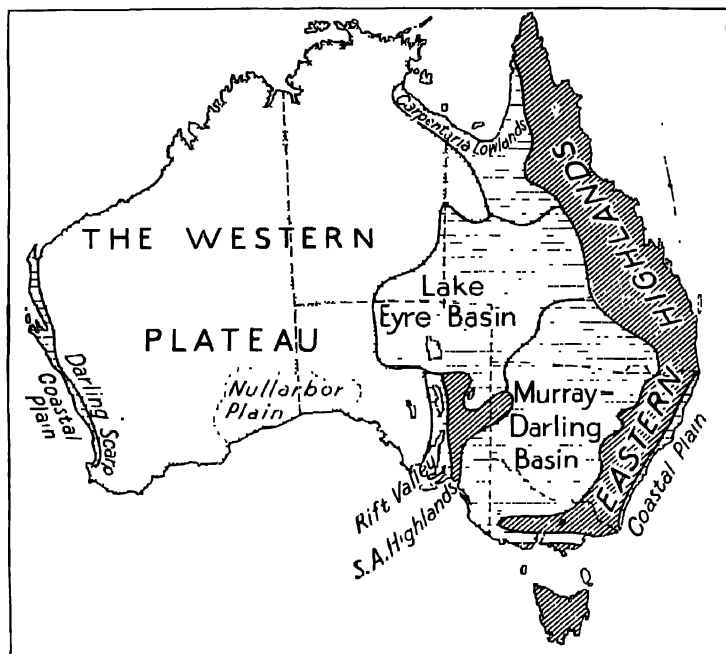


FIG. Au.2.—The main physical features of Australia.

PHYSICAL FEATURES

We will deal first with Australia itself, leaving New Zealand and New Guinea for separate description later. Australia falls naturally into three physical divisions:

(a) A great western plateau, mostly between 600 and 1,500 feet above sea-level.

(b) A central lowland, or succession of low-lying basins,

some of which are areas of inland drainage and part actually below sea-level.

(c) The eastern mountains. These mountains are not fold mountains, but are really formed by the edge of a plateau, which slopes gradually from east to west. The whole range is often called the "Great Dividing Range," but different parts have different names—Blue Mountains in New South Wales,



[Photo: L. D. Stamp.]

FIG. Au.3.—The Blue Mountains, New South Wales.

The photograph shows that the mountains are not fold mountains, but are simply the edge of a plateau.

Australian Alps in Victoria. The gentle slope to the west is the great grassland region, of which the Darling Downs of Queensland are part. There is only a very narrow plain between the mountainous edge of the plateau and the sea, but it forms a rich and important region.

There is only one really important river system in Australia—that is the Murray with its great tributary the Darling.

Notice how the streams rise from the Dividing Range and flow westwards down the gentle plateau slope.

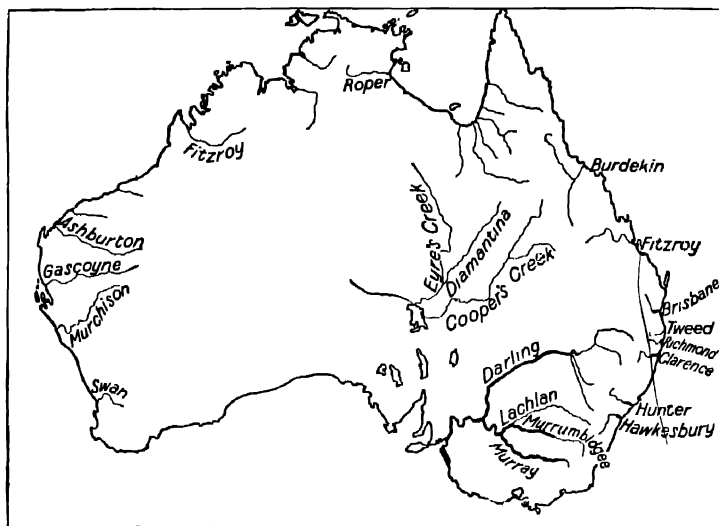


FIG. Au.4.—The rivers of Australia.

Principal navigable portions shown dark.

GEOLOGY AND MINERALS

As a whole Australia is rich in minerals. Most of the western plateau is a great mass of old crystalline rocks, and in the midst of the dry regions of Western Australia are several famous goldfields, notably at Kalgoorlie. The eastern part of Australia is also rich in minerals. Victoria has the once-famous goldfields of Ballarat and Bendigo, and copper is important in Queensland. It was the attraction of gold which first brought large numbers of white settlers to Australia, though when the rich goldfields became exhausted they turned to farming. In New South Wales is a large isolated hill, Broken Hill, with one of the richest deposits of silver-lead ore in the world. Both Queensland and New South Wales have good coal, but the great basin in New South Wales (the largest in the Southern Hemisphere) is especially important because it

is on the east coast and coal can be loaded almost direct from the mines into ocean steamers. The coal is worked especially near Newcastle (north of Sydney) and south of Sydney. For some years the annual value of the coal raised was roughly equal to that of all other minerals put together but gold has again become very important. Australia also has rich deposits of iron ore, but the best, such as those of Iron Knob, South Australia, are far from the coalfields.

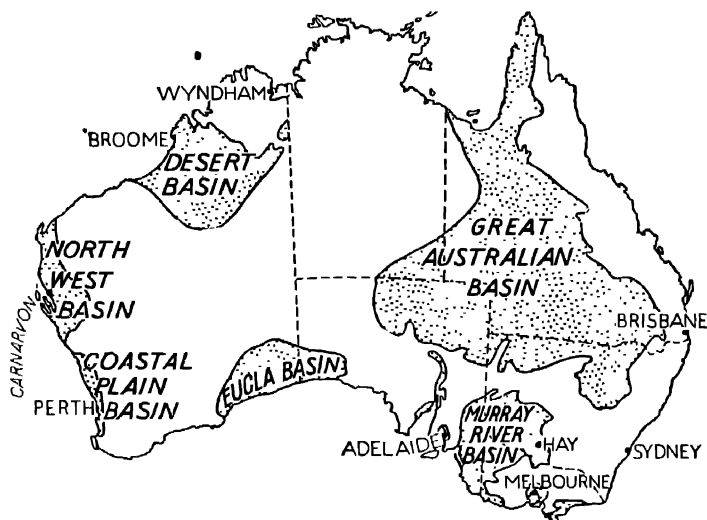


FIG. Au.5.—The artesian basins of Australia.

The most important is the Great Australian Basin. In some of the others, such as the Eucla Basin, the water is too salt to be of much use

It has already been noted that the land slopes gently westwards from the crest of the Dividing Range towards the central valley. This slope is an area without very much water, for the Dividing Range cuts off the rain-bearing easterly winds. Fortunately in this great region, stretching from the south of Queensland through New South Wales into Victoria, the rocks are arranged in the form of basins, and so "artesian wells" can be bored as shown in Fig. 70. The water from these wells has enabled large areas of dry country to be used as

cattle-rearing and sheep-rearing country. There is one great puzzle, however; Australian geologists cannot decide whether the water will one day be entirely used up, or whether the supply is being renewed underground by the rain which falls every year and sinks into the ground in other parts of Australia.

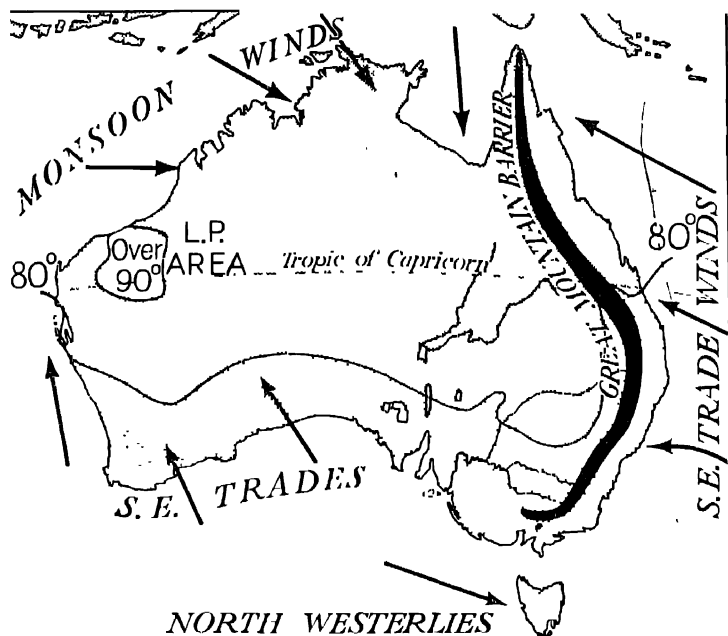


FIG. Au.6.—Climatic conditions in the hot season (November to April)

Notice the Low Pressure centre (L.P.) in the north caused by the great heat, and notice the monsoon winds which it causes. Along the East Coast local sea-breezes from the north-east are very important during the day-time in the summer. The temperatures are the January temperatures.

CLIMATE

Since the Tropic of Capricorn passes through the centre of Australia, we can compare the northern half of the continent with India lying in the same latitudes. In India, when the sun is shining vertically over the Tropic of Cancer, the land mass

of the Ganges Valley and N.W. India becomes very much heated, and this, of course, is the principal cause of the monsoon. In Australia, when the sun is shining vertically over the Tropic of Capricorn, the central land mass becomes greatly heated and a monsoon results. The northern coastlands of Australia are, therefore, tropical monsoon lands, but remember the

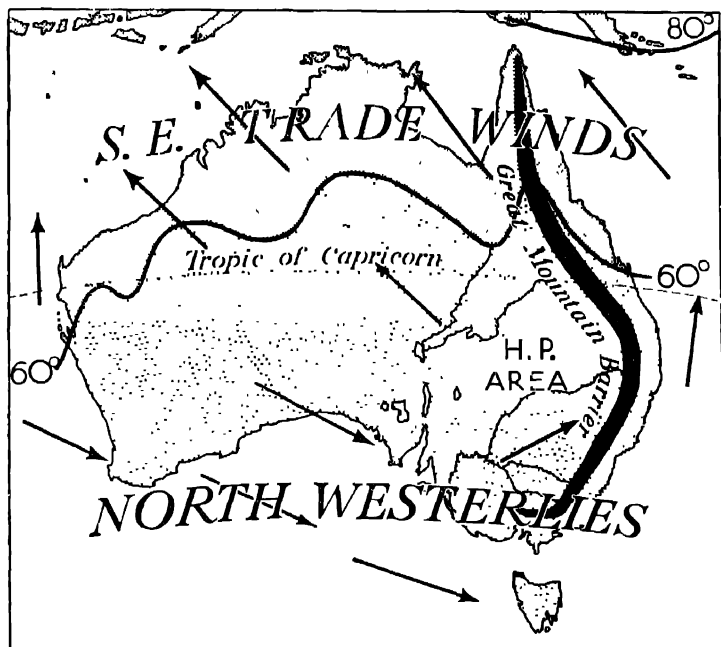


FIG. Au.7.— Climatic conditions in the cold season (May to October). Notice how the main wind systems have moved northwards and that the southern coasts come under the influence of the Westerly Winds. The temperatures shown are the average July temperatures

monsoon wind blows from the north-west (how is this to be explained?) and the rain falls from November to April. The east of Australia comes under the influence of the South-East Trade Winds. These winds are, however, drained of their moisture by the Great Dividing Range, and the whole of the centre of Australia receives very little rain indeed. We notice

that the centre of the continent lies in the same latitudes as the other great deserts of the world—the Kalahari, Atacama, Mexican, Sahara, Arabian, and Great Indian Deserts. The south-western and south-eastern tips of Australia enjoy a Mediterranean climate. In the southern summer they lie in the dry hot belt, but in winter come under the influence of the



FIG. Au.8.—The rainfall of Australia.

In the Tropics 20 inches of rainfall may be regarded as roughly a minimum for agricultural development; in the Temperate region 10 inches is sufficient. The 10-inch rainfall line is shown on Fig. Au.9 as the boundary of the Mediterranean region.

Westerly winds. Compare the latitude with other Mediterranean regions in the world.

Tasmania and New Zealand enjoy a moist temperate climate very like that of England. As we shall see later, the physical features of New Zealand cause great variations in the amount of rainfall from one part to another.

Apart from the fact that a great part of Australia receives very little rain, the amount which falls is very irregular. In some years there may be no rain at all in some parts of the interior and the farmers lose a great many of their sheep and cattle, though the danger of water shortage is not as great as it was before the development of the artesian basins.

Conditions during the Hot Season (November to April). At this period of the year the sun is shining vertically almost over the centre of Australia. Notice the large central area—very hot, and parts of it with an average temperature during the month of January of over 90° (see Fig. Au.6). The arrows in the north-west show the monsoon which results. Notice the heavy rain it brings to the northern coast (Fig. Au.8). Practically the whole of the east coast benefits from the Trade Winds, but only the narrow coastal strip receives heavy rain. Why is this? Note the moderating effect of the sea on the temperature of the east coast. At this period of the year the southern coast is dry—the westerly winds are blowing too far to the south to influence Australia. But hot spells of summer are sometimes interrupted by “southerly busters”—delightful, cool winds from the Antarctic.

Conditions during the Cold Season (May to October). At this time the sun is shining vertically far north of the equator and the whole of the north of Australia is under the influence of the Trade Winds—blowing except in Queensland from the dry interior. At this season the southern part of the continent comes in the westerly wind belt—hence the warm, moist winter characteristic of the Mediterranean climate. The land loses its heat very quickly compared with the sea, so that the central deserts are now slightly cooler than the sea-coasts. This is clear from the course of the 60° isotherm on Fig. Au.7.

CLIMATIC REGIONS AND NATURAL VEGETATION OF AUSTRALIA

We can now combine what we have learnt about physical relief and climate, and divide Australia into natural regions. It

is a little difficult to compare the natural vegetation of Australia with that of the other continents. Most of the trees are "eucalypts," or gum-trees, and are evergreen. Therefore, although there are regions in Australia where deciduous forests would normally grow, the gum-trees there remain evergreen.

(a) *The Tropical Climatic Region.* The coast is often fringed with mangrove swamps, passing inland to Monsoon or Evergreen Forests which soon give place to grasslands with scattered trees or savanas. The forests thus occupy narrow strips along the coasts and the *Tropical Grasslands* form a transition between the forests of the coast and the dry interior. The grasslands are most important in Queensland, where they provide some good cattle-ranching country.

(b) *The Hot Desert Climate* is found over an enormous area in the heart of Australia, both over the great plateau and over the central lowlands round Lake Eyre. The area of true desert with only the spiny grass (*Spinifex*) and sand occupies a comparatively small area in the centre; surrounding this there is a broad ring of scrubland consisting of "mulga" (acacia), "mallee" (eucalyptus), or blue-bush and salt-bush.

(c) *The Mediterranean Climate* occurs along the south-western and south-eastern coasts, including a considerable part of Victoria. In the wetter parts are fine forests of karri and jarrah trees.

(d) *The Temperate Grassland Climate* occupies most of the Murray-Darling Basin. The land which slopes down gradually from the crest of the eastern mountains to the central plain is occupied by grassland, but the rainfall is greatest near the mountainous edge of the plateau. Thus the grassland gets poorer from east to west (compare South Africa). In the wetter parts are fair numbers of trees.

(e) *The Eastralian Climatic Region* is found along the seaboard of New South Wales and has a well-distributed rainfall from the Trade Winds, but is also influenced by the Westerlies in winter. It is often classed with the China type of climate but the winters are not nearly so cold and the rainfall is not monsoonal. The normal vegetation is eucalypt forest.

(f) *The Cool Temperate Oceanic Climate*, like that of England, is found in Tasmania.

There are some specially interesting points to notice about the vegetation and animals of Australia. It is believed that the continent has been separated from other lands for a long, long time, and so its animals and plants are very peculiar. The most interesting plants are the eucalyptus trees, of which there

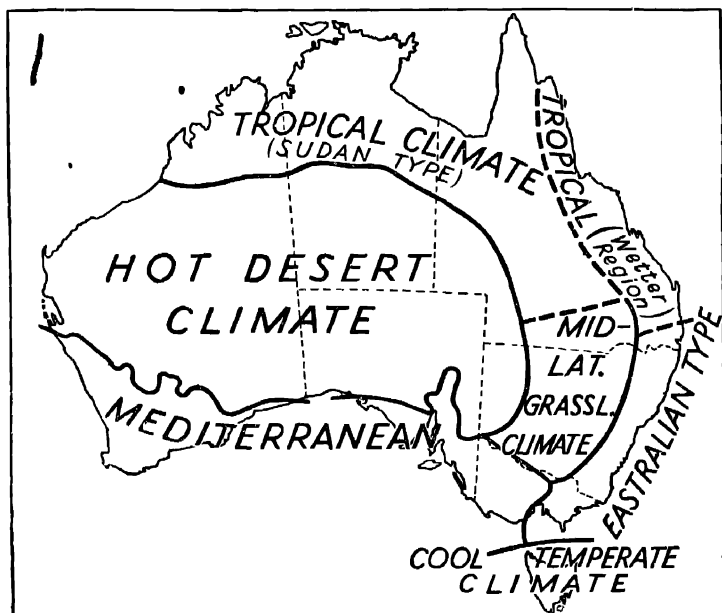


FIG. Au.9.—The climatic regions of Australia.

are many kinds. In the drier regions they form only scrubby bushes with small leaves. The trees give very little shade, because their leaves are arranged vertically. This "mallee scrub" of small eucalyptus bushes covers vast areas. In other places the scrub consists of small acacia bushes very like those in the dry parts of India. In the wetter regions—as in the monsoon lands of the north—the eucalyptus trees grow to a great size and are important for their wood, which is very hard and will not be eaten by white ants. Economically the

most important forests are the karri and jarrah forests of the Mediterranean regions of Western Australia and the fine blue gum and other forests occurring on the hill slopes of New South Wales, Victoria, and Tasmania.

The animals of Australia are still more distinctive. There are many kangaroos, which carry their young in a kind of pouch. Even more curious is the platypus, an animal with a beak like a duck and which lays eggs. Then there are big running birds such as the emu. In recent years European animals have been introduced into Australia. They have increased at an enormous rate—especially the rabbits—for there have been no enemies to worry them. Rabbits became so abundant that they were a serious nuisance and did great damage. Western Australia tried to keep them out by constructing a wire fence 2,000 miles long but the rabbits found ways to get through. Now they have been almost wiped out by the disease called myxomatosis.

POPULATION

When discovered by Europeans about 300 years ago, Australia was inhabited by natives who were in such a primitive stage that they used stone weapons. There were only a very few of them, and they have since decreased in numbers. In Tasmania they have all died out. The present population of Australia, apart from the few natives, consists almost entirely of white immigrants from Europe and their descendants. The Australian Government has reserved Australia for white people only. There are various parts of the world which are kept only for natives of various countries—there are parts of North America where there are American-Indian “reserves,” there are parts of New Zealand where only the Maoris may live—but Australia is the only country which the white people have reserved to themselves. Now look at the population map of Australia. The population is very small, but even then notice that the people are nearly all in the Mediterranean lands and the cooler part of the East Coast. The monsoon lands and tropical lands of the north, which one might expect to be thickly populated, have as yet very few people, and are very

little developed. One little point is noticeable on the map—the dots indicating people right away in the dry western interior. Why do people live there? Another very curious thing about Australia is that more than half the people live in the five great cities of Sydney, Melbourne, Brisbane, Adelaide, and Perth. This is partly because the people who migrate to Australia

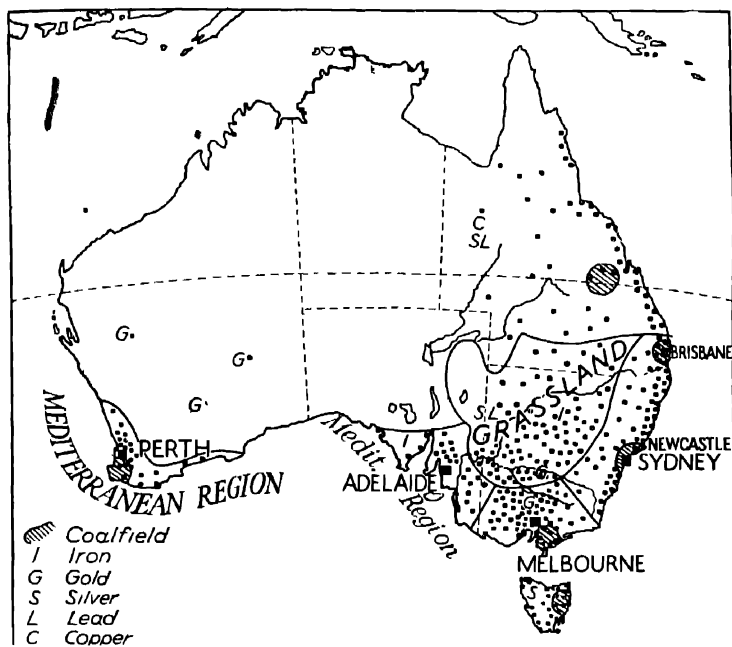


FIG. Au 10.—Detailed population map of Australia

Each dot on this map represents 10,000 people. Large towns are shown by a square dot. Notice that most people live in the Mediterranean Regions, the Temperate Grasslands and the Eastern Coasts. It would be little use constructing a population map such as that for Asia (Fig. 248) because there are only 10,000,000 people in Australia compared with 480,000,000 in India alone.

from Europe have been used to living in cities, and when they get to Australia they do not like to change their life.

GOVERNMENT

Australia is governed by the Australian Commonwealth Government and is one of the great self-governing Dominions

of the British Commonwealth. The whole country is divided into a number of states, which control their own affairs to a considerable extent. There is a very small area in the healthy hills near Sydney which actually belongs to the Commonwealth Government, and it is here that the capital, Canberra, is located. Directly under the control of the Commonwealth

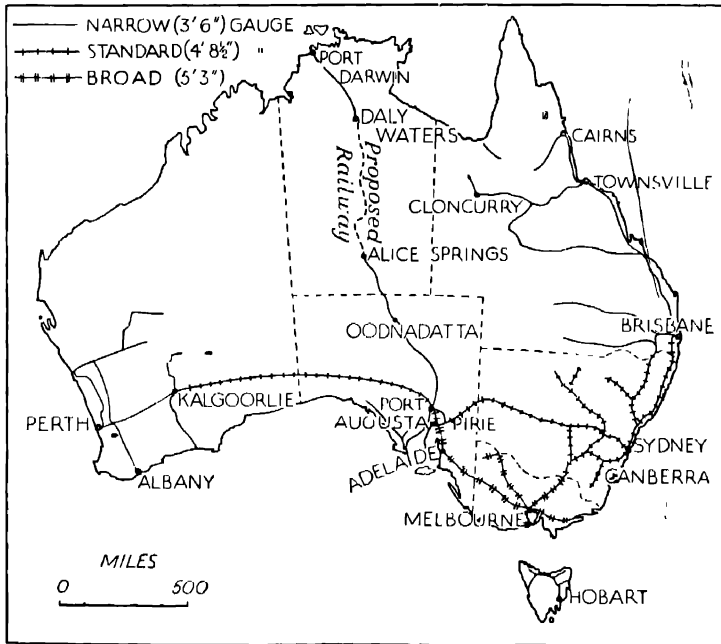


FIG. Au.11.—Railway map of Australia

Notice carefully the numerous breaks in railway gauge. Work out a journey from Perth to Brisbane. How many changes of train are necessary, and where are they?

Government are the large, undeveloped tracts of the centre and north—the Northern Territory. Until 1901 the states of Australia were quite separate, and this has had one or two very bad results. Each state began building its own railways, usually starting from the capital. Now nearly all the railways are joined up, but there are three different gauges, so it is impossible to travel right through without changing trains.

Remembering this we must note there is a railway from extreme east to extreme west across the south of the continent, but not from north to south. The railway builders found it very difficult to connect the fertile eastern coastlands with the interior owing to the great Dividing Range, but made use of various natural gaps. In a country of such vast distances great use is now made of air services and private aeroplanes. Many doctors use aeroplanes so that they can quickly visit distant farms under the famous scheme known as the "Flying Doctor Service."

TRADE AND WORLD RELATIONS OF AUSTRALIA

As the Commonwealth of Australia embraces the whole of the continent, we may take the trade of all the states together. Australia is a vast land, very thinly peopled as yet, but having a great amount of land awaiting development. As one would expect, it is a great pastoral and agricultural country. But in recent years big strides have been made in the development of factory industries—both those using raw materials produced in Australia and those using imported raw materials. But Australia still exports a considerable part of its natural products and takes manufactured goods in exchange. In addition to agricultural and pastoral products Australia is rich in minerals, and so gold, copper, silver, and lead are important exports. The agricultural and pastoral products depend upon the climate of Australia. There is a large area of monsoon and tropical land, but it is little developed and the most noteworthy products of these regions are sugar (from Queensland)—at least enough sugar for the whole continent is produced—bananas, and other fruits. Then there is land with a Mediterranean climate—producing and exporting oranges, wine, wheat, and various fruits. The forested part of this region (in Western Australia and Victoria) produces good hard timber. Victoria and the well-watered land of the East Coast have most of the dairy cattle (see Fig. Au.15) and export hides. Victoria and Tasmania grow and export apples. But the grasslands are some of the most important lands of Australia, and produce huge quantities of wool,

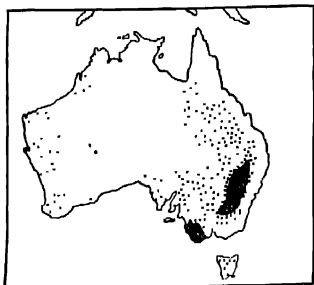


FIG. Au.12.—The distribution of sheep in Australia

There are over 130,000,000 sheep. Notice that nearly all the sheep are found where the rainfall is between 10 and 30 inches per year, and most of them south of the tropics.



FIG. Au.13.—The distribution of cattle in Australia.

There are over 16,000,000 cattle. Notice that the cattle are found mainly to the east of the sheep regions—that is, on the wetter coastlands and richer parts of the grasslands.

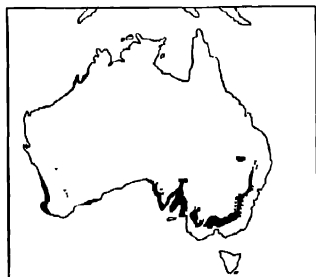


FIG. Au.14.—The wheatlands of Australia

Notice that they occupy roughly the same areas as the sheep. The yield is about 150,000,000 bushels. Notice that all the wheat is grown in temperate Australia—south of the Tropic of Capricorn and nearly all where the rainfall is between 10 and 40 inches per year—especially between 20 and 30.

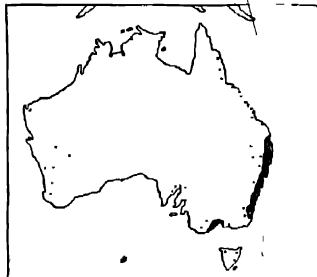


FIG. Au.15.—The dairy-farming regions of Australia.

Notice their location on the wet east coast. Compare England.

mutton (see Fig. Au. 12 for the distribution of sheep), hides (for leather), as well as wheat (see Fig. Au.14) and other grains. The first diagram opposite shows the relative importance of all these exports; the second diagram shows the imports.

The Australian Government has what is called a "Preferential Tariff System." Goods coming into the country are

taxed, but the tax is much less on goods coming from the United Kingdom or Canada or New Zealand. This is one way in which Australia helps the members of the Commonwealth and they in turn help Australia. Naturally the main

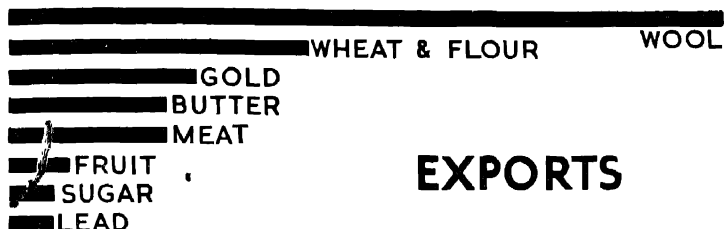


FIG. Au.16.—The exports of Australia.

exchange must be between Australia and an industrial country. About half the total trade is with Great Britain. United States, Japan and India also share largely, whilst large quantities of exports go to the countries of continental Europe.

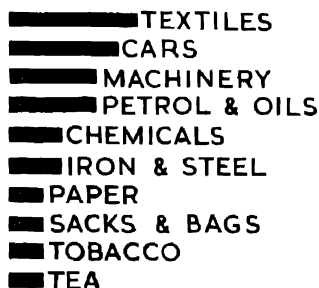
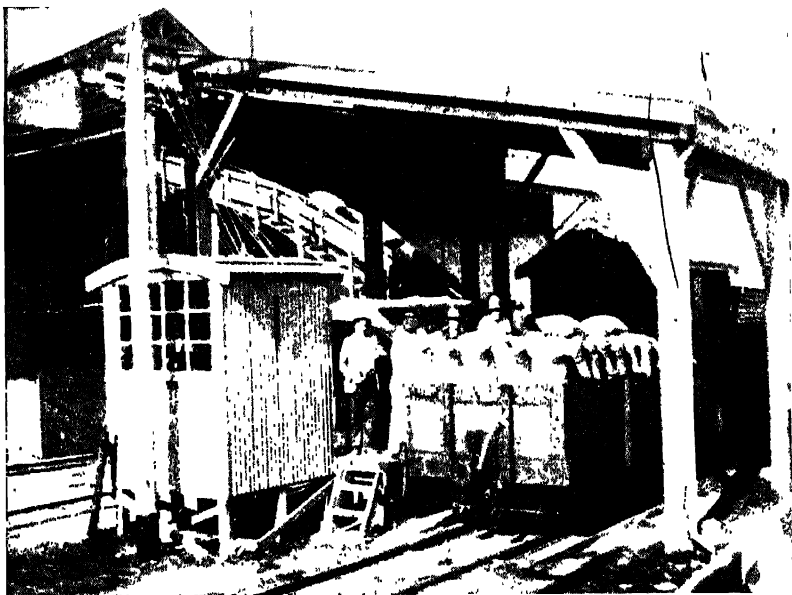


FIG. Au.17.—The imports of Australia

Now notice the position of Australia in relation to world trade. The great ocean routes from Europe, Africa, and Asia touch Western Australia (Fremantle) first. From Fremantle the steamers go to Adelaide, Melbourne, Sydney, and Brisbane. Less important is the route round the north of Australia, calling at Brisbane first. Some tramp-steamers follow this

route, but from Europe it is less direct. Running parallel to the shore of Queensland is a great bank of coral, called the Great Barrier Reef. Between the reef and the land is beautifully calm water, but steamers have to be very careful not to run on to the reef. So dangerous is it that sailing ships did not travel by night.



[Photo: L. D. Stamp.]

FIG. Au.18.—Handling wheat in bags.

Notice the railway truck full of bags of wheat. The men are loading them on a carrier which takes them into the shed. Some of the bags can be seen being carried up. On the other side of the shed is the quay to which steamers come.

The Panama Canal has made a great difference to Australia. Not only does more than half the trade between New Zealand and Europe pass through the Panama Canal but much trade from Australia too. Sydney is the most convenient port of Australia in connection with the Panama Canal route.

Regular air services link Britain and Australia, *via* Singapore, and Australia can be reached from London in two days.

Darwin in Northern Australia has become the new "front door" into Australia. Other services bring the east coast of Australia within two days of the west coast of Canada and the United States.

WESTERN AUSTRALIA

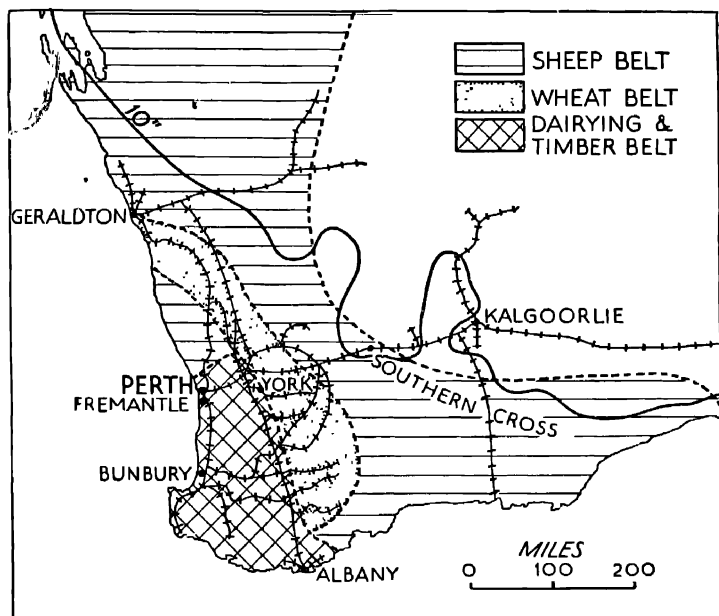


FIG. Au 19.—Swanland.

This is the largest state, occupying one-third of the whole of Australia, but a large part is very arid. In the north the fertile monsoon country is as yet little developed and nearly all the people live in the Mediterranean lands to the south-west, where we find Perth, the capital, and its port Fremantle. (Fig. Au.10 shows the distribution of people.) Large stretches of the coast-line are unbroken and there are few good harbours—an exception is the fine port of Albany. We must not forget the gold-mining centres. The south-western part of Australia

W.(E.)—17

can grow the vine and many Mediterranean products, as well as wheat, barley, and oats, whilst there is much grassland suitable for sheep. Western Australia is more than half of the size of the whole of India, but the total number of people is less than a million.

THE NORTHERN TERRITORY

The north and centre of Australia are at present almost uninhabited. There is a coastal fringe of forest and mangrove swamp, but farther inland is a broad belt of savanna land with good grass suitable for cattle. The one town of northern Australia, Darwin, has become much more important since the development of air routes. Alice Springs (formerly called Stuart) in the heart of the continent is connected by railway with Adelaide, but the railway is little used.

SOUTH AUSTRALIA

The northern part of South Australia is a dry area of inland drainage. On Fig. Au.4, however, several long rivers are marked, flowing into a large lake named Lake Eyre. Really these rivers are only filled with water perhaps a few days in the year, and at other times are dry. Lake Eyre, too, for most of the year is a flat marshy area with a few large pools here and there.

The southern part of the country lies in the Mediterranean region, and is the only part of importance. Scrublands, capable of supporting a few sheep, occur along the railway to Western Australia in the area known as the Nullarbor Plains. But the most developed parts are around Adelaide on the sunny fertile slopes of the South Australia Highlands (Fig. Au.2) and on the borders of Victoria and New South Wales to the south-east. It is in that region that the Murray-Darling flows into the lagoon known as Lake Alexandrina and then into the sea. Unfortunately sandbanks at the mouth prevent ocean steamers going directly up the river. Indeed, the South Australians value the Murray River mainly for purposes of irrigation, and in the irrigated area there are fine vineyards and fruit orchards.

Most of the coast of South Australia is unbroken and fringed by cliffs, but there are two big gulfs—Spencer Gulf and St. Vincent Gulf. Adelaide, the capital of the state, is situated near the latter gulf; its port is Port Adelaide. South Australia in some ways benefits from its neighbours. All the silver and lead from Broken Hill (New South Wales) are brought down by rail and exported through Pirie in South Australia. Much of the produce of the Murray-Darling Basin is also exported through South Australia.

VICTORIA

Though the smallest, Victoria is in many ways the most important of the Australian states. The eastern mountains, here known as the Australian Alps, swing round to become almost east and west in Victoria, and so cut the country into two halves—a northern and a southern. Notice from Fig. Au.20 the fine position of Melbourne and its communications. Then note the clear division of the country into four parts:

- (1) The Great Plains to the north (low rainfall).
- (2) The Australian Alps and Great Dividing Range.
- (3) The Great Valley (moderate rainfall).
- (4) The Otway and Gippsland Hills—low plateaus.

(1) *The Great Plains* form part of the Murray Basin, and parts of them are irrigated (especially around Mildura) and yield Mediterranean fruits. The most important crop is, however, wheat, whilst enormous numbers of sheep are reared.

(2) *The Australian Alps* are built of old rocks and so, as one might expect, are the location of several mining districts, now largely exhausted—Bendigo, Ballarat, etc. The hills are forested, and the timber is of considerable value.

(3) *The Great Valley* is a fertile region devoted to dairy farming (note that the rainfall is heavier than that of the Murray Basin) and general farming. Some large deposits of brown coal are quarried and used for the generation of electricity and making of briquettes.

(4) *The Otway and Gippsland Hills* are forested.

Note carefully the position of Melbourne. It can be

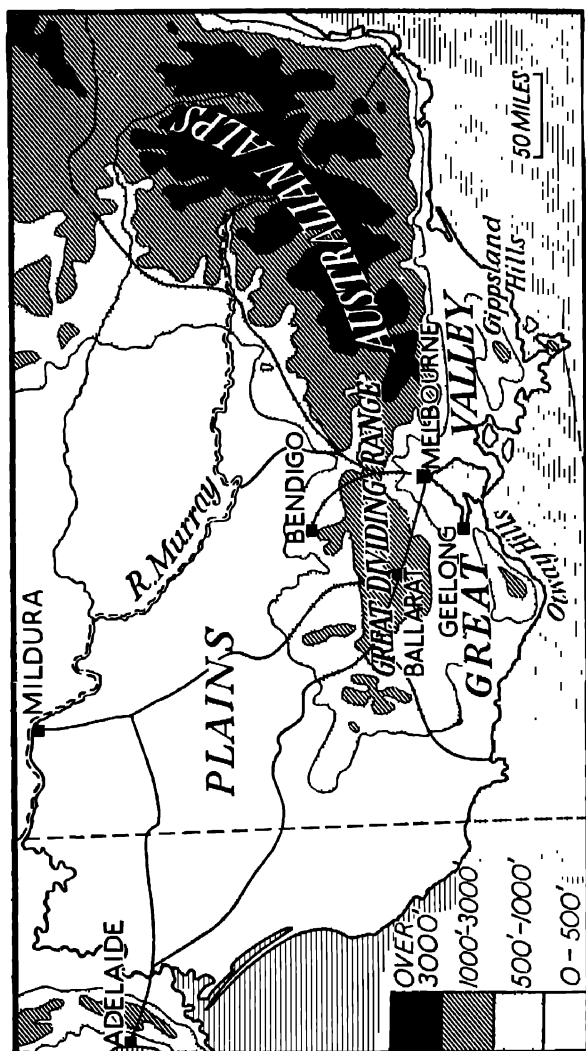


FIG. Au.20.—The natural regions of Victoria.

reached direct by most ships, but big ships stop at Port Melbourne (east) or Geelong (west) on the great harbour of Port Phillip. Its communications into the interior have been helped by a gap through the Australian Alps to the north.

NEW SOUTH WALES

New South Wales falls broadly into two divisions:

(a) The narrow coastal region, between the crest of the mountains and the sea.

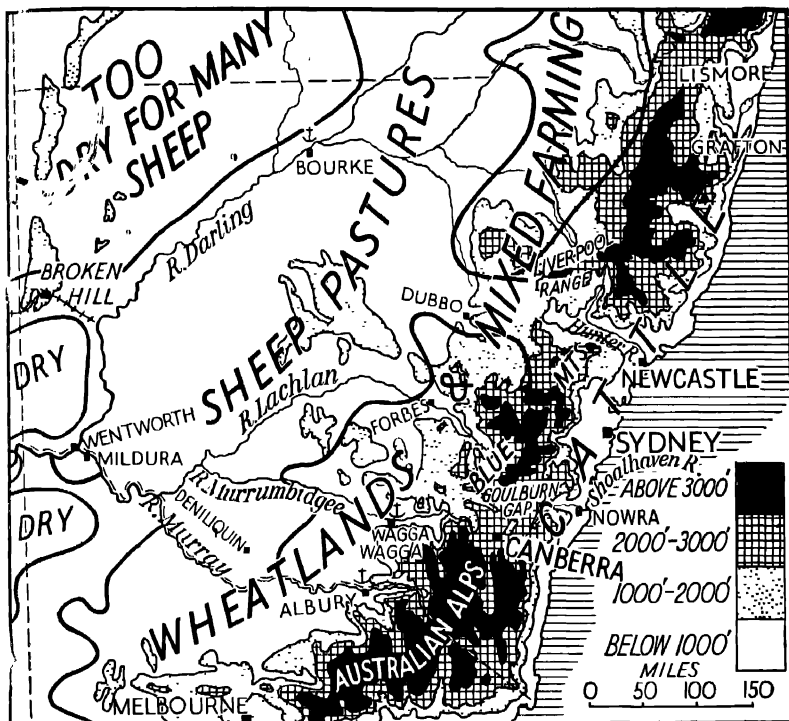


FIG. Au.21.—New South Wales.

(b) The Murray-Darling Basin, or Temperate Grassland region, sloping gently westwards.

(a) The Coastal Plain, though very narrow, is one of the most important districts of Australia. It grows considerable quantities of maize and, as we should expect from its damp climate, cattle are much more important than sheep (compare Figs. Au.12 and Au.13). In this part is the biggest coalfield of Australia. The great coal port of Australia is



FIG. Au.22.—Section across New South Wales from west to east.

Newcastle. *Sydney*, the capital, a huge city with a million and a half inhabitants, is situated in this part of the state, on one of the finest natural harbours in the world (Port Jackson). Notice its connection by rail north and south along the coast, and, by more difficult routes, with the interior. The northern part of the plain, watered by the Clarence, Richmond, and Tweed, is particularly fertile.

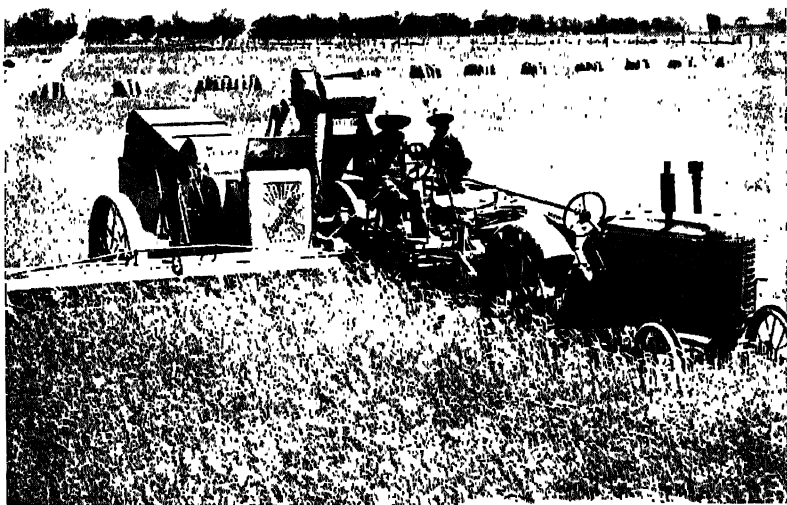


[Photo: Australian Govt. Immigration Dept]

FIG. Au.23.—Part of Sydney, New South Wales, from the air.

Notice the many high buildings, more like New York than London. In the foreground is the Circular Quay from which ferryboats go to all parts of the famous harbour.

(b) *The Downs, or Temperate Grasslands.* In the wetter eastern regions the grass is rich and suitable for cattle; westwards the slightly drier regions are ideal for wheat and sheep. In the wetter eastern part trees are numerous. Study Figs. Au.14 and Au.15 again. To the south-west the important district is the Riverina, between the Murray and Murrumbidgee rivers. The Riverina is a flat area covered with silt which is



[Photo: Australian News Bureau]

FIG. Au.24.—Harvesting wheat by machinery.

This machine cuts the wheat, thrashes it, and deposits sacks full of wheat (seen in the background). This one machine cuts a pathway 27 feet wide. Notice the extra tractor or "leader" in front

very fertile, especially when irrigated. Though the rainfall is sufficient for some types of farming, large irrigation works have been developed. Sheep farming is very important in this region also. The Murray and also the Murrumbidgee are fed by the snow from the Australian Alps and so are navigable the whole year, whereas the Darling, though a larger river, partly dries up during the year. The people of New South Wales, Victoria, and South Australia all value the Murray river, and

disputes have arisen because the water is required both for navigation and for irrigation—hence the great advantages of the united government afforded by the union of the separate states into the Australian Commonwealth. See what we said about irrigation in India and Egypt which has only been possible under a united government. The drier north-western parts of New South Wales come within the artesian region. Nearly on the border of New South Wales and South Australia is the great mining district of Broken Hill.

QUEENSLAND

Queensland falls into two divisions, like those of New South Wales, but the state is farther north and the climate is hotter throughout:

(a) The coastal plains enjoy a tropical climate with good rainfall. They produce quantities of sugar, rice, maize, and tropical fruits, but actually the quantities produced are limited by the small areas of flat land as well as by labour difficulties and lack of population. Sugar is the most important product. The Great Dividing Range behind the coastal plains includes the mining districts in which Queensland is rich—copper, gold, and tin. Important mining centres are Mount Morgan and Charters Towers. Large coalfields occur, but are too far from present lines of communication to be worked profitably.

(b) The western plains slope down gradually from the crest of the Great Dividing Range. In the wetter regions to the north cattle are important, but in the dry artesian basin of the south sheep are far more important and considerable areas grow wheat. On the border of North Australia are some hills of old rocks with valuable minerals notably Mt. Isa. On the western side of York Peninsula are vast bauxite deposits.

Nearly all the important towns of Queensland are on the coasts, and serve as outlets to the mining or pastoral districts. Notice the position of the ports of Cairns, Townsville, and Rockhampton opposite gaps or passes through the mountains. The capital, Brisbane (515,000 in 1955), is also the chief port.

TASMANIA

Tasmania is a small island about the same size as Scotland or Ireland, lying south of Australia. Physically it is a mass of

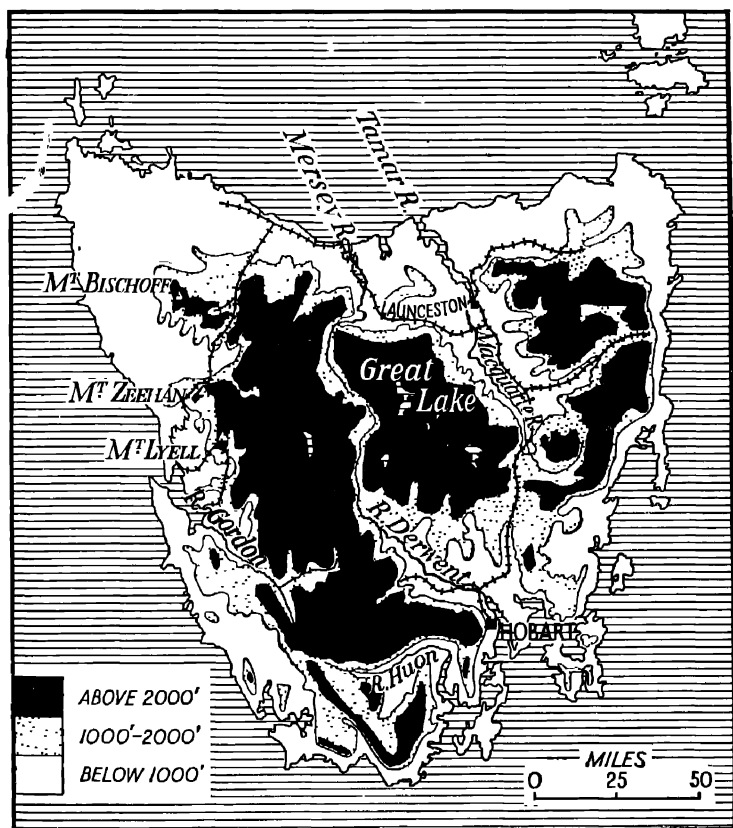


FIG. Au.25.—Tasmania

mountains and hills with small fertile valleys. In the highlands of the north-west are some important mineral deposits—copper, silver, lead, gold, and tin—notably at Mt. Lyell, Mt. Zeehan, and Mt. Bischoff. It has a healthy temperate climate, somewhat like that of North-Western Europe, and in the w.(E.)—17*

valleys and on the level tracts of the east wheat, barley, and fruits are grown. Tasmanian apples are particularly fine and are exported, especially to Britain. Much of the higher land is forested. The principal town is *Hobart*; *Launceston* is the chief port.

NEW ZEALAND

The Dominion of New Zealand consists of two large islands and a number of smaller islands in the South Pacific Ocean. Its area is 103,285 square miles—rather less than the British Isles. Running through the two main islands is a mountain backbone. In the South Island the backbone (Southern Alps) is near the west coast and the plains are on the east; in the North Island the backbone is nearer the east and the plains are on the west. This has a tremendous effect on the climate, especially as the mountains in the South Island are so high (up to 12,000 feet in Mount Cook) that they are always covered with snow. In the North Island there is a large central area of volcanic rocks and several isolated volcanoes.

Climate. Except perhaps at the extreme northern end, which is in the same latitude as Spain and has an almost Mediterranean climate, the whole of New Zealand falls in the Westerly Wind Belt. Hence there is a heavy rainfall on the west of the islands and a low rainfall on the east. Compare the rainfall of the British Isles, and compare the effect of the Southern Alps and the Pennines.

Natural Regions. (a) *The Mountains of the South Island.* Most of the region with heavy rainfall—unless it is too high—is forested; mountain pastures suitable for sheep occur in places, and especially in the drier parts to the north-east. Mining is not now an important occupation, though gold occurs as well as coal, copper, and New Zealand greenstone. The coal is obtained mainly in the vicinity of Westport and Greymouth, on the west coast. There has been an important development of water power.

(b) *The Grasslands of the South Island.* In the south grass covers much of the Otago Plateau and, although somewhat

poor, supports large numbers of sheep. Oats are grown. This district is served by the port of Dunedin. The Canterbury Plains and Downland, farther north along the east coast, are the richest part of the South Island. In the old days sheep were kept for the sake of their wool, but now huge quantities of frozen lamb and mutton are sent to Britain, and sheep producing both good wool and good mutton require to be fed on good grass. As a result, much of the grass now grown is of best English kinds. Wheat and garden produce are also grown. Notice the association of oats with poorer colder land and wheat with warmer richer land, and compare Scotland with England. The principal town in this region is *Christchurch*; eight miles away is its port, *Lyttelton*. Near Christchurch is the fertile Banks Peninsula, producing some of the butter and cheese for which New Zealand is famous.

Special mention must be made of the sheltered lands around Tasman Bay (centre, Nelson) and Marlborough Province (centre, Blenheim) at the northern end of the South Island.

(c) *The Mountains of the North Island.* Here the mountains are lower and on the drier side of the island. This region is very varied but has much downland suitable for sheep. *Napier* is the port serving this region.

(d) *The Auckland Peninsula.* This narrow peninsula enjoys a warm, almost Mediterranean climate, and fruits such as the vine, orange, and lemon can be grown. Grass suitable for cattle will grow well, and this is one of the great dairy-farming areas. Forests of Kauri pine occur in this region, and the collecting of gum from these trees (used in making varnish) was an important industry. Gold is also found. *Auckland*, the largest town in New Zealand, is situated on a very narrow part of the peninsula and so commands both coasts, but the good harbour is on the east side. It is a port of call for steamers between Australia and America—especially from Sydney to Vancouver. It has now an international airport.

(e) *The Volcanic Districts of the North Island.* In the centre of this region hot springs and geysers occur, and it is not long since volcanoes were active. Earthquakes are still common. The soils are often dry and poor, but much land has been afforested with imported conifers.

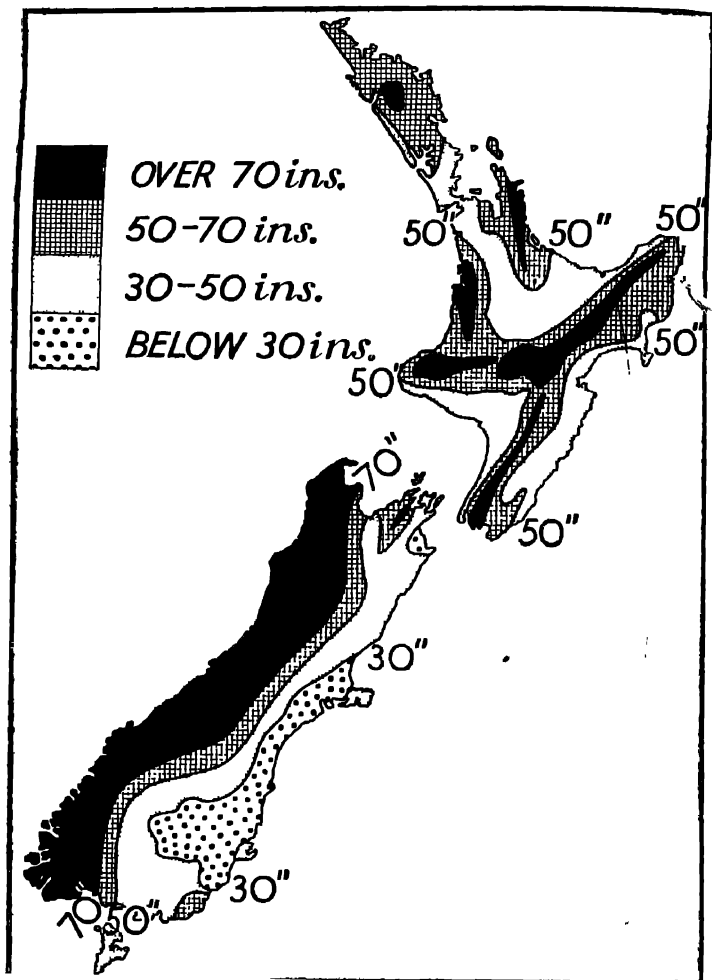


FIG. Au.26.—Rainfall map of New Zealand.

Notice that no part of the Dominion is really dry. Contrast Australia.

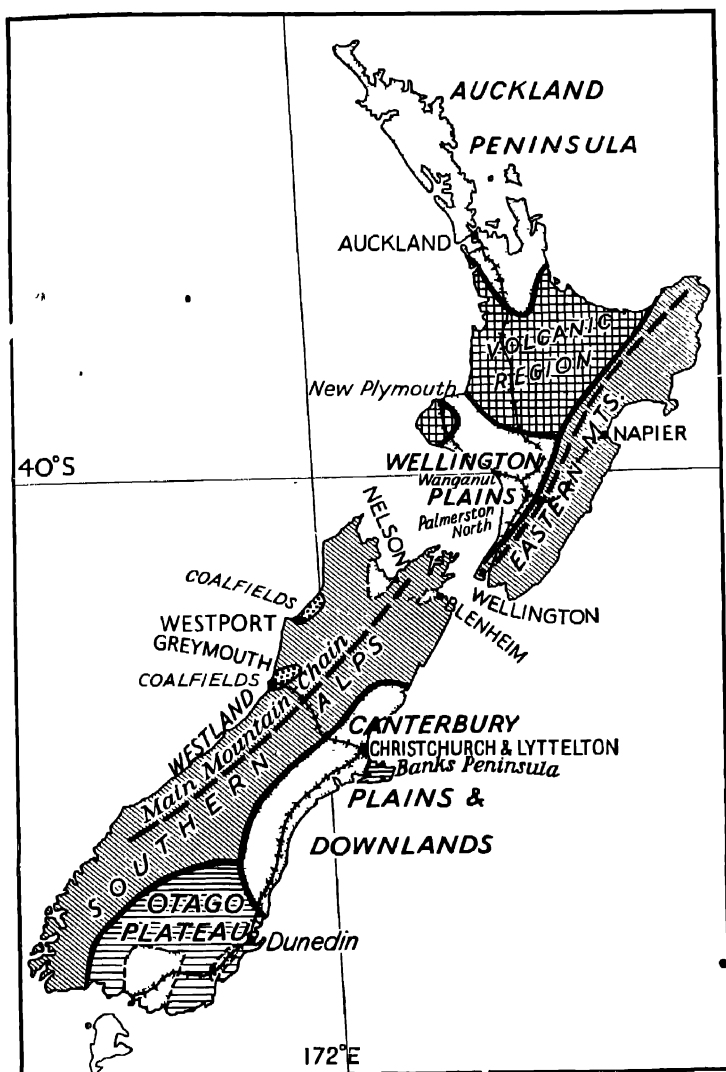


FIG. Au.27.—The physical features and natural regions of New Zealand.

The more important plains which lie amongst the mountains or plateau lands are separately shown. The Wellington Plains lie actually north of Wellington and are better called the Wanganui Lowlands

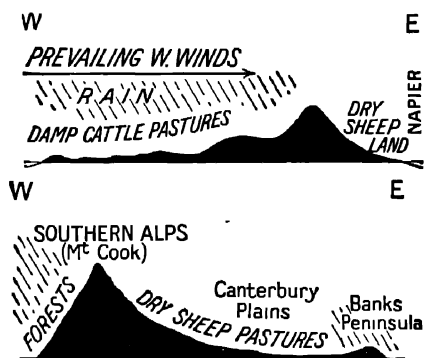


FIG. Au.28.—Sections across the North Island and South Island New Zealand.

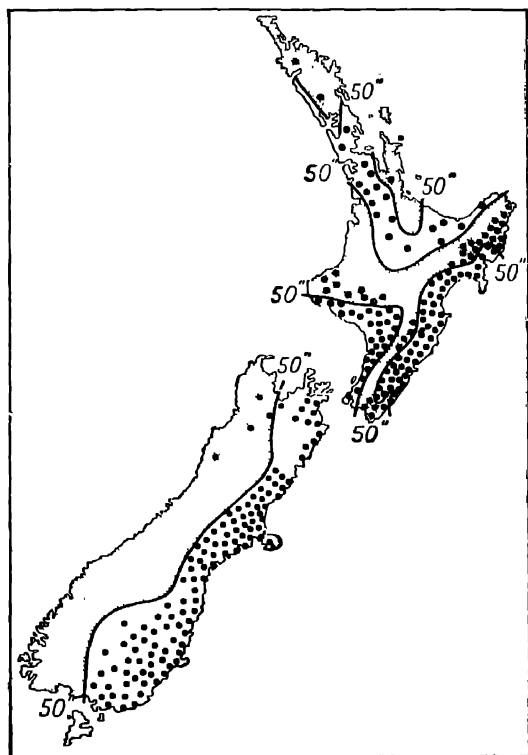


FIG. Au.29.—The distribution of sheep in New Zealand. Each dot represents 100,000 sheep. Notice that nearly all the sheep are found where the rainfall is less than 50 inches.

(f) *The Wanganui Lowlands* occur to the south-west of the volcanic region and form one of the chief dairying regions. New Plymouth, Wanganui, and Palmerston North are centres of the dairying industry. Wellington, the capital of New Zealand, lies at the southern end of the mountains of the North Island and to the south of the main dairying region.

Trade and Communications.

What we said about the trade of Australia applies almost exactly to New Zealand. New Zealand lamb, wool, butter, and cheese are much in demand in England and always of a good quality. The quality of the butter and cheese compares more than favourably with that of Danish

products. The four staple exports, butter, lamb, wool, and cheese, form the greater part of the trade. Eighty per cent. of the exports go to Great Britain, which supplies over fifty per cent. of the imports.

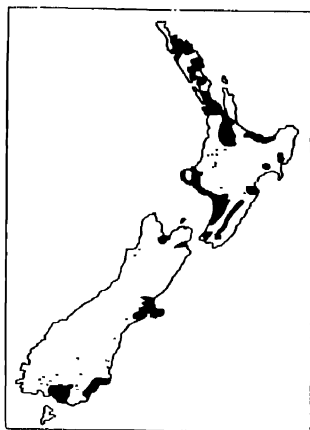


FIG. Au 30.—The distribution of the dairy-farming industry in New Zealand.

EXPORTS

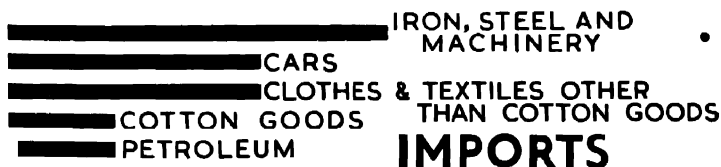
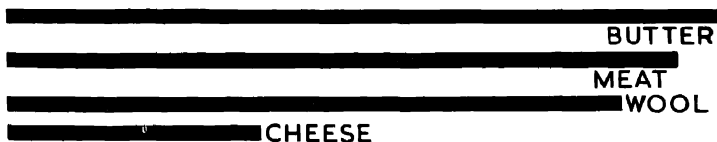


FIG. Au.31.—The trade of New Zealand.

Total value of the trade is very great, exports being usually in excess of imports.

Notice the railways of New Zealand. Many of them have been constructed at much expense, and the longest tunnel in the British Commonwealth goes through the Southern Alps and links the east and west coasts of South Island. Much use is made now of the excellent roads.

NEW GUINEA

The large island of New Guinea is situated in the Equatorial region, and the lowlands are covered with hot wet evergreen forests. The interior is occupied by a plateau, partly covered with dense tropical grassland. The inhabitants of New Guinea included cannibal tribes, and the interior of the island was, until recently, little known. The eastern half of the island is administered by Australia (Papua and British New Guinea), the western half is under the control of the Netherlands. The growing of coconuts and winning of gold are two industries.

PACIFIC ISLANDS

Scattered over the surface of the Pacific Ocean are enormous numbers of small islands. Most of them are coral islands, or volcanic islands surrounded by a coral reef. Coconut palms flourish on nearly all the islands and are sometimes the only large plants.

Islands Administered by New Zealand. The former German Islands of Western Samoa are administered by New Zealand, and export copra and cacao beans. So also do the Cook Islands, attached to New Zealand in 1901; and also the Union Group. Nauru or Pleasant Island is important owing to the rich deposits of phosphate, sent to Great Britain, Australia, and New Zealand.

The Hawaiian Islands belong to the United States. The principal town, Honolulu, is now a large city, an important port of call for ocean and air liners crossing the Pacific, and a popular tourist resort. The islands are famous for their pineapple and sugar plantations; the canning and export of pineapples is now a large industry. There is a famous active

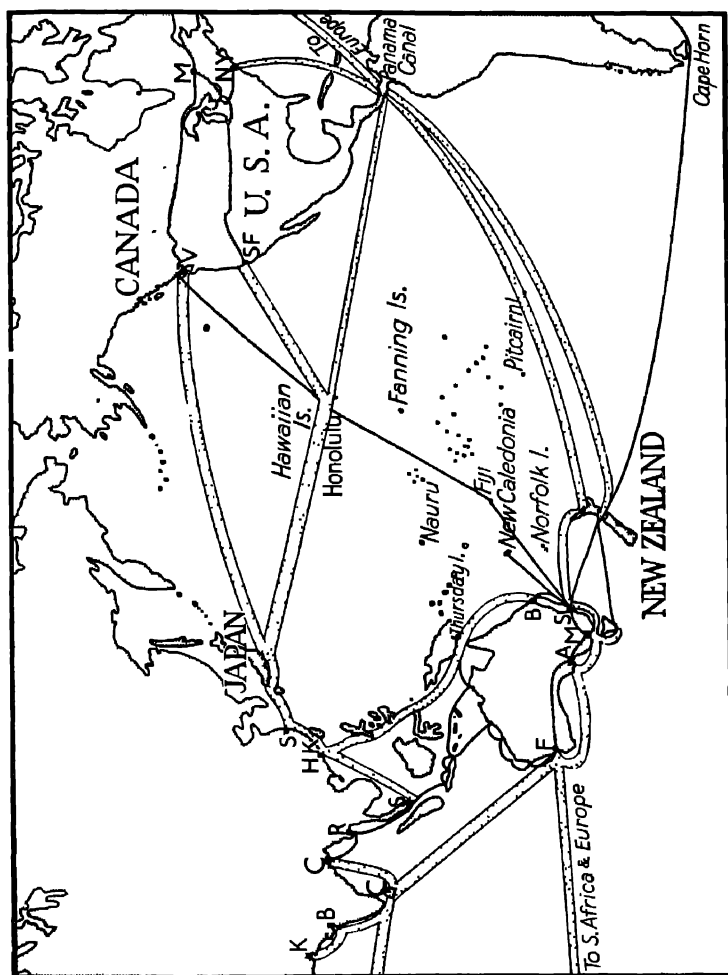


Fig. Au.32.—Trade routes of the Pacific Ocean.

volcano, Mauna Loa, on one of the islands, and on its flanks is a subsidiary volcano (Kilauea) the crater of which is occupied by a lake of molten lava which can actually be visited and studied. In 1959 Hawaii became the 50th "State" of the United States.

The Fiji Islands consist of about 80 inhabited islands and

form a British Colony. They lie on the trade routes between Australia and New Zealand on the one side, and Canada and the United States on the other. Sugar and copra are exported.

New Caledonia is a French possession, formerly used as a convict settlement. It has large deposits of nickel ore.

Some of the tiny islands of the Pacific are used as "signal stations." They are equipped with wireless apparatus and pass on messages received from ships. Ships can only send their wireless messages for a certain distance, and so signal stations on land have to pass on the messages. Examples of islands used for this purpose are Thursday Island, Norfolk Island, Fanning Island (also cable stations) and Ocean Island. There are valuable phosphate deposits on Ocean Island. Many of the islands now have airfields, facilitating trans-Pacific mail and passenger air services.

ANTARCTICA

The barren Antarctic continent consists largely of a high plateau, but is covered for the most part to a great depth by ice and snow. It is gradually being explored, and in recent expeditions aeroplanes have been much used. The South Pole was first reached by Amundsen on December 16th, 1911, and a few weeks later (on January 25th, 1912) by Scott and his four companions, who perished on the return journey. Under the name of the Ross Dependency a large sector has been placed under the Government of New Zealand; other sectors are claimed by Australia, Britain (Falkland Islands Dependency), Norway, and France. The whale-fishing industry is one of great value in antarctic waters and is being exploited by Norwegian, British, and other whalers.

In 1957-58 (the International Geophysical Year) a number of nations, including Russia, the United States, Britain and Japan, joined together to carry out scientific exploration of the continent.

QUESTIONS AND EXERCISES

1. Write an account, with sketch-maps, of the mineral wealth of Australia.
2. Where is the monsoon region of Australia? How do you think this region might be developed?

3. Describe a journey round the coast of Australia.

4. Describe a journey across Australia from Perth to Brisbane.

Draw sketch-maps to show the route taken.

5. Write a full account of sheep farming in Australia.

6. Compare and contrast the Murray-Darling Basin with that of the Ganges-Brahmaputra.

7. Draw sketch-maps to show the importance of the position of Melbourne, Auckland, and Port Darwin.

8. Give an account of the settlement and development of Australia.

9. Compare and contrast New Zealand with (a) the British Isles, (b) Japan.

10. What do you know of the South Sea Islands?

11. Where are the following, and what is the importance of each: Darling Downs, Canterbury Plains, Riverina, Broken Hill, Cooper's Creek, Otago Plateau?

12. How has the opening of the Panama Canal affected Australia and New Zealand?

AFRICA

POSITION AND SIZE

AFRICA is the second largest continent, being next to Asia in size. Its area is 11,000,000 square miles, of which one-

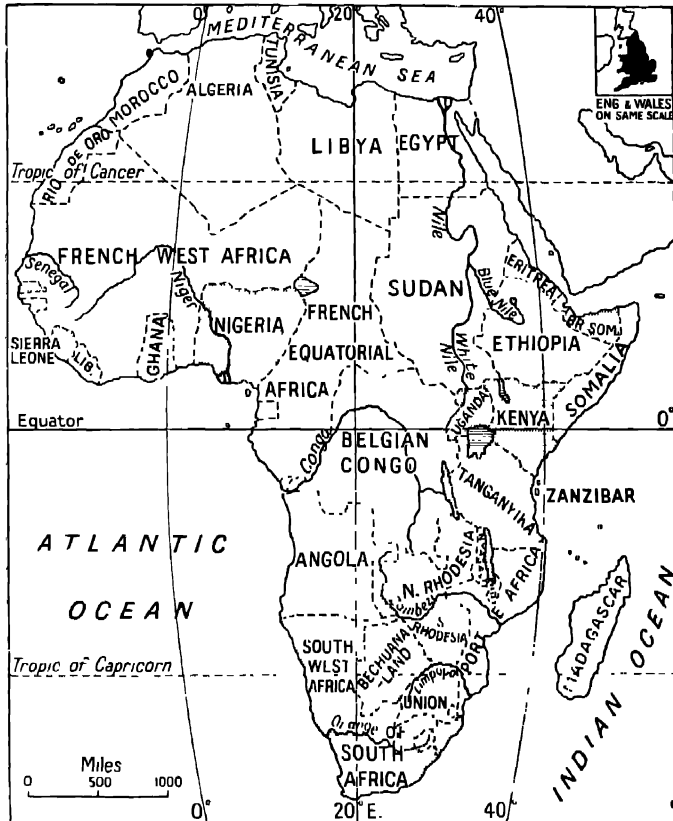


FIG. Af.1.—Africa, showing position, size, and political divisions.

seventh forms British South Africa. For its size Africa has a very short coast-line. It is three times as large as Europe, but its coast-line is only 19,000 miles long—shorter than that

of Europe. Africa is the only continent which is almost cut in half by the equator. Rather more of Africa lies to the north of the equator than south of it, because the continent is broader in the north than in the south, but the north and south coasts are almost exactly equal distances from the equator. Notice the position of the Tropics of Cancer and Capricorn, and what a large part of Africa lies within the Tropics. Running from north to south through the continent and passing through its southernmost point is longitude 20° E. This is the same meridian as passes through the centre of Europe.

PHYSICAL FEATURES

In its physical features, Africa is a little like Australia in build, as it is a compact continent of the plateau type. Except in the north-west, where we find the Atlas series of fold mountains, belonging really to the European system, the whole of Africa is occupied by a great plateau. The great African Plateau is usually surrounded by a narrow coastal plain. Sometimes, as in South Africa, there are several "steps" up on to the plateau. The plateau is higher in the south than it is in the north. The high plateau of South Africa stretches nearly as far north as the equator, and then sends broad branches northwards over the lower plateau there. Running along the eastern side of the surface of the plateau there are one or more lines of mountains. They start from the mountain knot of Abyssinia and run southwards through the Lake region of East Africa. These mountains are *not* fold mountains; they are of volcanic origin, being built up by lavas which poured out on the surface of the plateau. In south-east Africa the edge of the plateau is very high and forms the Drakensberg escarpment.

Rivers. The rivers of Africa have special features which make them different from the rivers of the other continents. Most of them rise on the surface of the plateau, and have a long navigable course over the plateau until they reach its edge. There they drop down to the coastal plain by a series of rapids or falls. It follows that very few of the rivers are navi-

gable far inland from the coast, but their upper courses can be used. Some of the rivers, notably the Nile, descend from the plateaus by a series of cataracts. The most important rivers of Africa are the Nile, which flows northwards into the Medi-

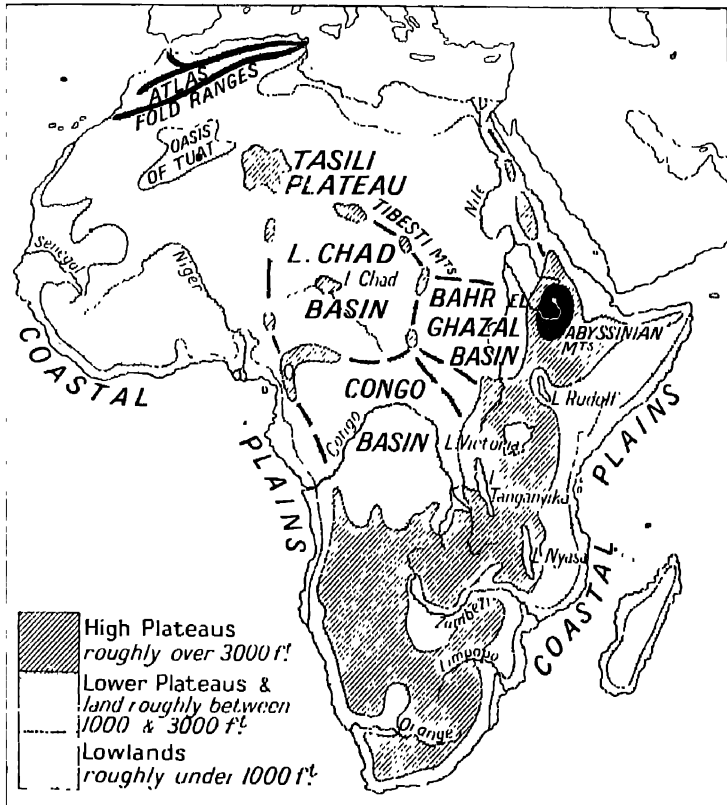


FIG. Af.2.—The main physical features of Africa.

terranean Sea; the Senegal, Niger, Congo, and Orange draining into the Atlantic Ocean; and the Limpopo and Zambezi flowing into the Indian Ocean. The big basin of the River Congo, forming a depression in the African Plateau, should be noted.

An important feature of the plateau is the series of great lakes amongst the volcanic mountains of the east. The lakes occupy two main lines, probably rift valleys, with Lakes Albert, Edward, and Tanganyika along the western line, and Lakes



[Photo: South African Railways Publicity Dept.]

FIG. Af.3.—The edge, known as the Drakensberg, of the high plateau of South Africa

Rudolf and Nyasa along the eastern line. Lake Victoria lies between the two lines. To the south of the Sahara lies Lake Chad, the centre of a region of inland drainage.

CLIMATE

Africa lies both to the north and to the south of the equator, and so we must be careful in talking about the "Cold Season" or "Winter," and the "Hot Season" or "Summer." When

the Hot Season is prevailing in North Africa it is the Cold Season in the south. When it is the Hot Season in the south it is the Cold Season in the north.

Conditions from November to April. At this season the sun

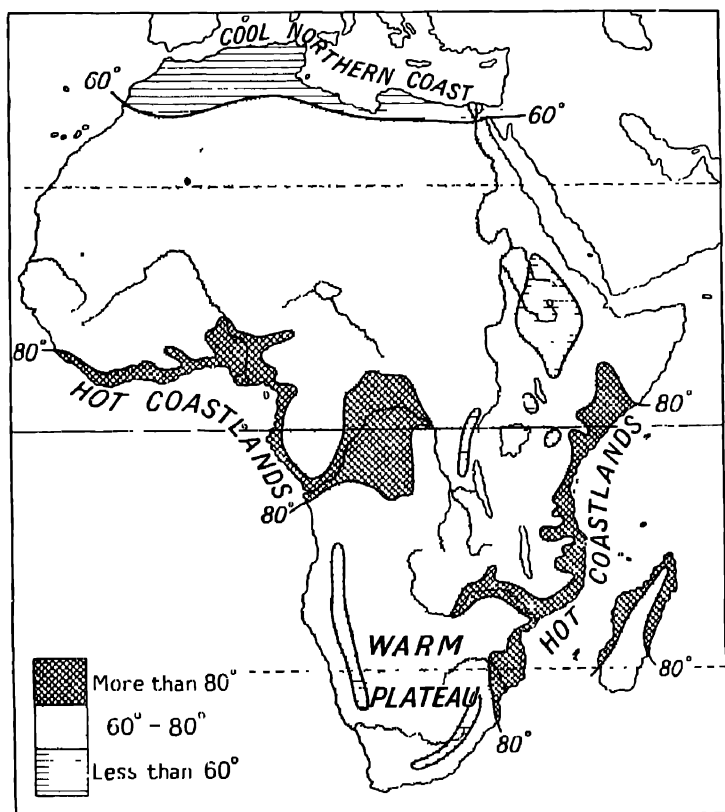


FIG. Af.4.—Climate: actual temperatures in January.

is shining vertically south of the equator. In January the sun is vertical over south Africa, but most of the plateau is over 4,000 feet, and so fairly cool. The hottest parts of southern Africa are the lowlands of the east coast. At this season it gets cooler northwards from the equator, and the coolest part is the

northern coast of Africa. The winds of Africa are relatively simple. We only need to take a physical map of Africa and mark on it the regular wind systems, remembering that in January they have swung to the south, and in June swing to the

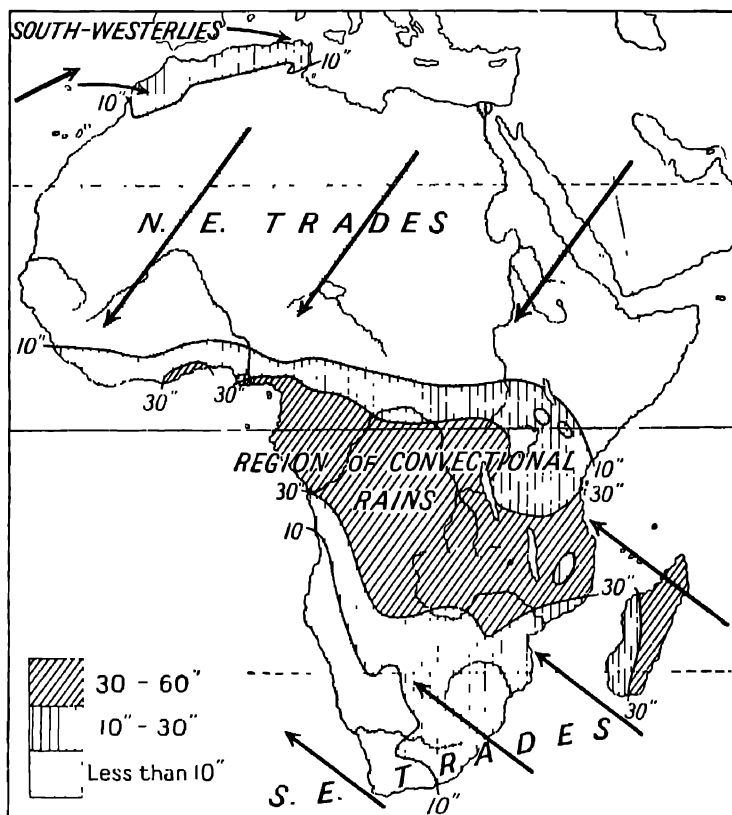


FIG Af.5.—Climate: rainfall and winds. November to April.

north. During the period November to April the northern coast of Africa comes under the influence of the South-Westerlies and enjoys a mild wet winter (Mediterranean Climate). The High Pressure Belt, from which the North-East Trade Winds start, lies across the north of Africa, and so these winds

start from a land mass and are dry. They blow towards warmer regions and so do not normally yield rain unless forced upwards. In the belt on either side of the equator itself convectional rains fall, and south of the equator there is a good

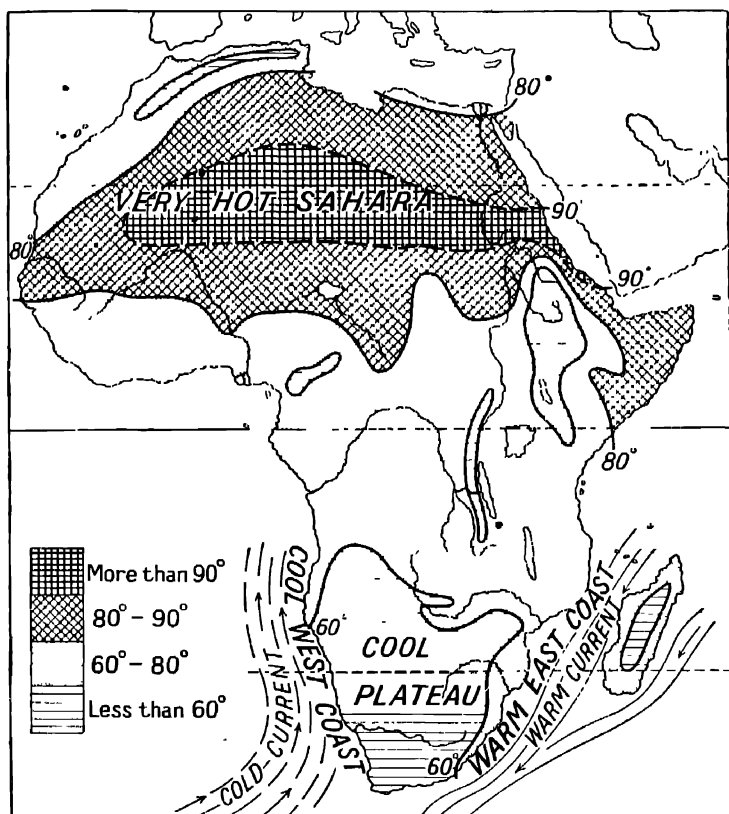


FIG. Af.6.—Climate: actual temperatures in July.

rainfall, brought by the South-East Trade Winds. The rainfall is heaviest on the east coast and gets less as we cross the continent, so that there is a dry area on the west. At this season of the year the extreme south-west of Africa lies in the High Pressure Belt from which the Trade Winds start, and so is dry.

Conditions from May to October. At this season the sun is shining vertically over the Tropic of Cancer, and the great land area covered by the Sahara Desert gets very hot indeed. At this season the temperature gets less as we go southwards

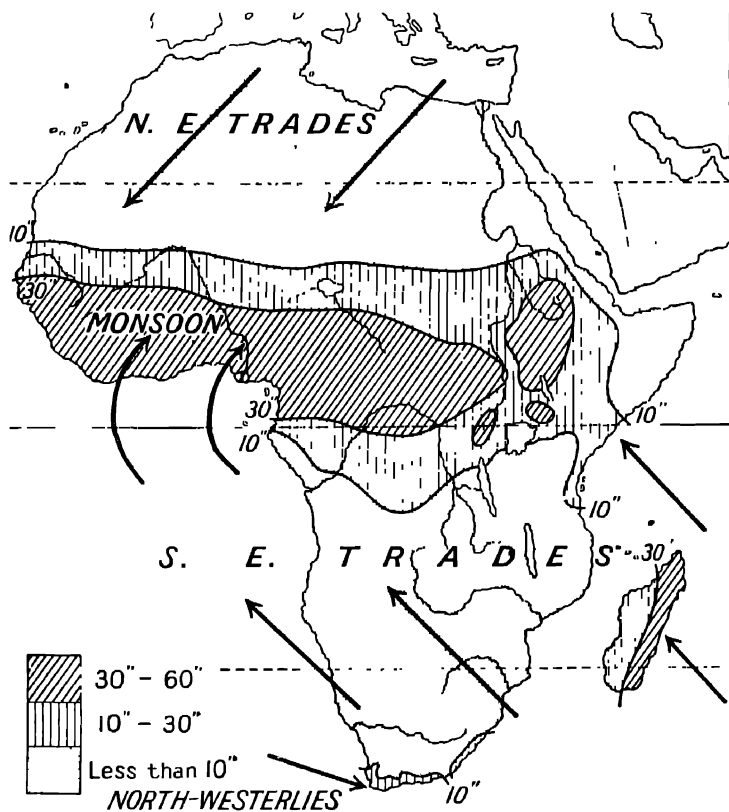


FIG. Af.7.—Climate: rainfall and winds, May to October.

from the Sahara. The whole of North Africa is dry, for it lies under the Trade Wind belt. South of the equator the region of the South-East Trades has shifted northwards, and the extreme south-west receives the rainy North-Westerlies. It is at this season, when the Sahara Desert gets very hot

indeed, that the hot air rises and moisture-laden winds flow in from over the equatorial ocean waters of West Africa towards the southern Sahara. These winds are really monsoon winds and form a continuation of the South-East Trade Winds. They bring a very heavy rainfall to the coast of Guinea.

The Climates of Africa. The climates of Africa are arranged so that we find the same types to the north of the equator as there are to the south.

(a) Equatorial Climate, always hot and wet, is found along the equator, especially in the Basin of the Congo and along part of the coast of the Gulf of Guinea.

(b) Tropical Climate, with rain in the summer and dry in the cool season, is found both north and south of the equator. But in the north the "summer" is from May to October, whilst in the south it is from November to April. So characteristic of Africa is this climate that it is often called the "Sudan type."

(c) Desert Climate, dry at all seasons, is found along the High Pressure Belts in the north and in the south. In the north it stretches right across the continent, but in the south it is found only on the west of the continent.

(d) Warm Temperate East Coast Climate is found along the east coast of south Africa because the east receives moisture from the Trade Winds blowing across the Indian Ocean.

(e) Mediterranean Climate, with winter rain and summer drought, is found both along the north and along the south-west coasts. Again, "summer" in the north is from May to October, in the south from November to April.

(f) Mid-latitude Grassland Climate occurs on the plateau in South Africa.

Since nearly the whole of Africa is a plateau, with the plateau especially high in the south, we find the climates are often much cooler than they would be if the surface of Africa were lower. So there are lands almost on the equator but high on the plateau in east Africa suitable for settlement by white farmers.

THE VEGETATION OF AFRICA

The vegetation belts of Africa correspond very closely with the climatic belts.

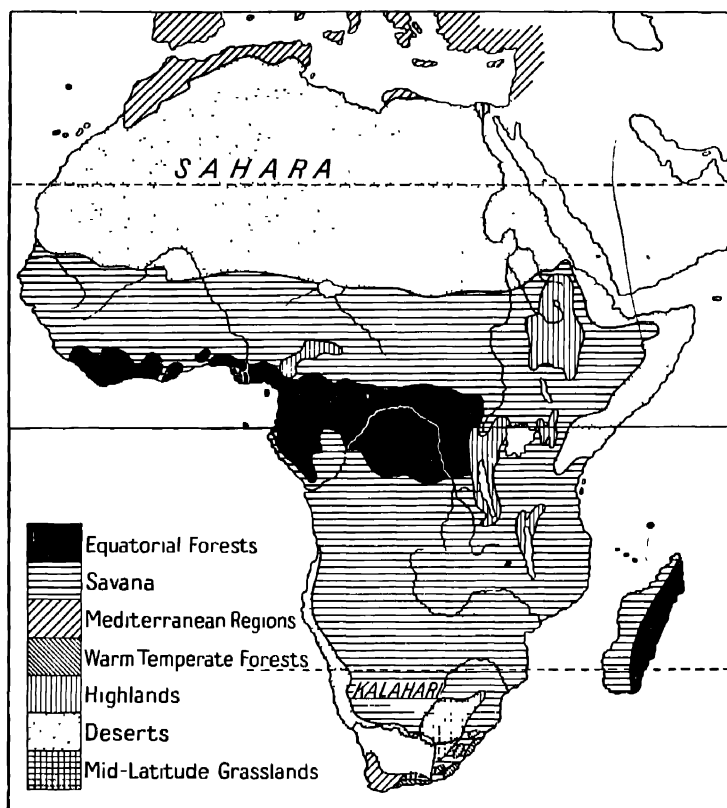


FIG. Af.8.—The natural vegetation of Africa.

(a) Equatorial Forests of tall evergreen trees cover the Basin of the Congo and the Guinea Coast, where the rainfall is very heavy.

(b) Tropical Grassland and Savannas occupy a broad belt on either side of the Equatorial Forests. The most characteristic

type of vegetation in Africa is the savana—known in the south as bush veld. As we approach the desert region the savana becomes poorer and poorer and passes into scrubland. Much of the Kalahari “desert” is really scrubland.

(c) Deserts cover enormous areas in North Africa (Sahara Desert) and a smaller area in South Africa (the south-west coast). Sometimes they are great sandy wastes, at other times bare, rocky mountain ridges break up the surface. There are many important oases in the Sahara; most important of all is the long narrow valley of the Lower Nile, which derives its water from that river.

(d) Warm Temperate Forests occur in Natal in the south-east.

(e) Mediterranean Vegetation is found near and along the coasts of north Africa and in the south-west tip of the continent.

(f) Temperate Grassland covers the south-eastern part of the African Plateau. The region is known as the veld. It is cool in winter and hot in summer, but it is not a great distance from the sea as are the grasslands of Europe, and North America, and so does not suffer from the same extremes of temperature. In South Africa nearly all the natural vegetation is called “veld” just as “bush” is used in Australia. The temperate grassland is really the “High Veld” because it is found on the heights of the plateau.

(g) Mountain Vegetation, with temperate forests and grasslands, covers much of the Abyssinian and East African Highlands.

NATURAL REGIONS OF AFRICA

The major natural regions correspond with the vegetation regions. Make a list of them, noting the physical features, climate, and vegetation of each.

THE POPULATION OF AFRICA

In Asia we learnt that the Himalaya mountains form a great barrier to the human race. Indians are found on one

side and Mongolians on the other. In Africa we find that a great desert can also act as a barrier to mankind. North of the Sahara the people are Arabs and Egyptians, and are closely allied to the peoples of Southern Europe. But Africa south of the Sahara Desert is inhabited almost entirely by negroid peoples with black skins and woolly hair. In the

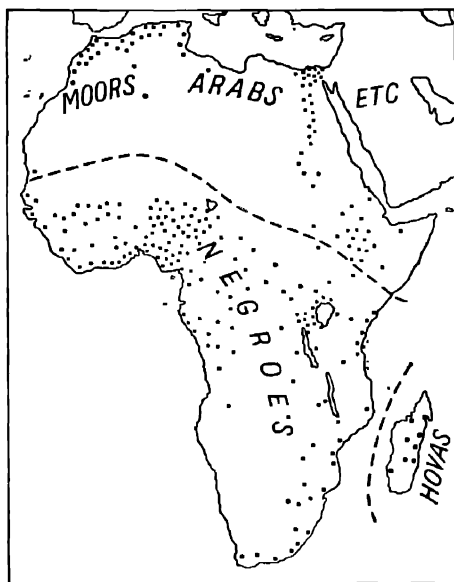


FIG. Af.9.—The population of Africa.
Each dot represents 500,000 people. This map is on the same scale as the population maps of the other continents

part of Africa south of the Sahara we find also a few small groups of very backward, uncivilised people. These people survive in these parts of the continent where conditions are very hard, as in the heart of the equatorial forests of the Congo (here the Pygmies live), and on the borders of the Kalahari Desert (here the Bushmen live). Africa is not very thickly populated, and so, with a more systematic use of the land, the Continent could support more

people. The white man has settled over a large part of South Africa—on the temperate grasslands of the plateau and in the Mediterranean region.

THE OPENING UP OF AFRICA

Until the present century Africa was often known as the "Dark Continent," for it was very little known to the world outside. There are no great bays or gulfs penetrating inland,

the rivers are interrupted by rapids near their mouths, the coastal belts are unhealthy, and the Sahara Desert forms a great barrier hindering exploration from the north. So the interior of Africa remained for long unknown to Europeans. The opening up of Africa commenced with the discoveries of great explorers such as Livingstone who discovered the Victoria Falls in 1855. The Negroes for long had suffered from slave traders but later the wickedness of slavery was realised. By the end of the nineteenth century nearly the whole of Africa came under the rule of European nations, but many African peoples are making rapid progress towards self-government. Since the end of Second World War in 1945 Libya, Sudan, Morocco and Tunisia have all become independent and, in 1957, Ghana became an independent member of the British Commonwealth.

THE UNION OF SOUTH AFRICA

The greater part of South Africa is occupied by the British Dominion called the Union of South Africa. The Union of South Africa consists of four provinces which joined together in 1910. The provinces are the Cape of Good Hope, Natal, the Orange Free State, and the Transvaal. After the First World War the Union was given charge of South-West Africa, which previously belonged to Germany. Lying in South Africa are also the native territories of Basutoland, Swaziland, and Bechuanaland, under British protection.

Lying to the north of the Union, and quite separate in government, is the self-governing colony of Southern Rhodesia, now part of the Federation of Rhodesia and Nyasaland.

Physical Features. Before studying the geography of South Africa, go back and see what was said about the physical features of Africa. South Africa consists of two main divisions:

(1) The Plateau, nearly all of which is more than 3,000 feet above sea-level. The south-eastern edge is the highest and nearly everywhere is 6,000 feet high. The edge has been given different names in different parts. The highest parts are known as the Stormberg and Drakensberg Mountains. The plateau slopes from east to west, and so the rivers flow from east to

west. Most of the Plateau of South Africa is drained by the Orange River and its great tributary the Vaal.

(2) The lands between the edge of the high plateau and the sea. The high plateau does not drop directly to a coastal plain, but the land descends by a series of steps and the coastal



Photo: South African Railways Publicity Dept.

FIG. Af.10.—The Cape of Good Hope

plain is often quite narrow or even absent. Along the south coast the steps are very definite, as shown in Fig. Af.11, and form the Little and Great Karoos.

Climate. The south-west is under the influence of the rain-bearing westerly winds only in winter, and so this region has a Mediterranean Climate. The remainder of South Africa is in the South-East Trade Wind Belt, with the result that summer

is the rainy season, and the heaviest rainfall is in the east and on the edge of the plateau. The surface of the plateau is in the rain-shadow of the Stormberg and Drakensberg Mountains, and the rainfall gets less and less from east to west.

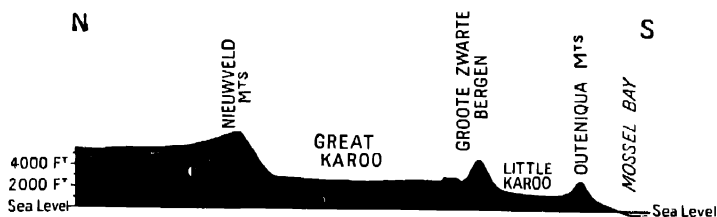


FIG. Af.11.—Section from the Veld (Central Plateau) to the south coast.

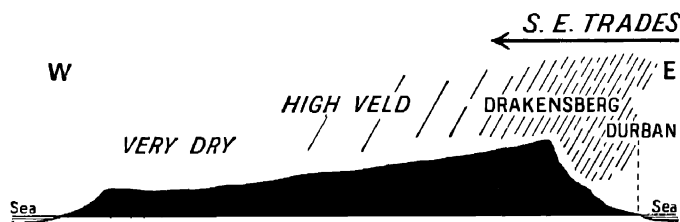


FIG. Af.12.—Section across South Africa.

Natural Regions. Considering physical features and climate together, South Africa can be divided into six large natural regions:

- (1) The Mediterranean Region of the South-West.
- (2) The Karoos.
- (3) The South-East Coast and Highlands, or Sub-Tropical Region.
- (4) The Grasslands of the High Plateau (eastern part), or High Veld.
- (5) The Scrubland of the High Plateau (western part).
- (6) The Namib or West Coast Desert.

The Mediterranean Region occupies the coastlands around the great port of Cape Town. Wheat and barley are grown, and so are Mediterranean fruits—grapes, peaches, and oranges.

There are wine-making, fruit-tinning, and jam-making industries. The coastal region is broadest in the south-west, to the east it gets narrow. It is not a coastal plain, but

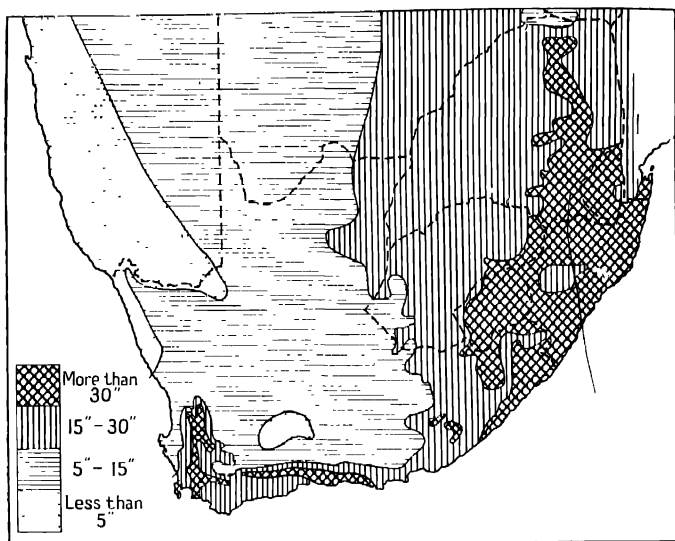


FIG. Af.13.— Simple rainfall map of South Africa.

In the south-west it is winter rainfall (Mediterranean), in the rest of South Africa summer rainfall.



FIG. Af.14.—The rainfall of Cape Town (winter rain)



FIG. Af.15.—The rainfall of Pretoria (summer rain).

broken up into rugged mountains and fertile valleys. Cape Town has a fine harbour, the natural shelter afforded by Table Bay having been improved by the construction of an artificial harbour (See Fig. 113). It is a port of call for all

steamers going round the Cape to India or Australia. At the extreme east of the region is the town of Port Elizabeth, which has also a considerable summer rainfall.

It was this part of South Africa which was first settled by Europeans, and there are very few negroes living there.

The Karoos. Between the Mediterranean coastlands and the high plateau there are two main steps—the Little Karoo and the Great Karoo. The rainfall is low, and the extremes

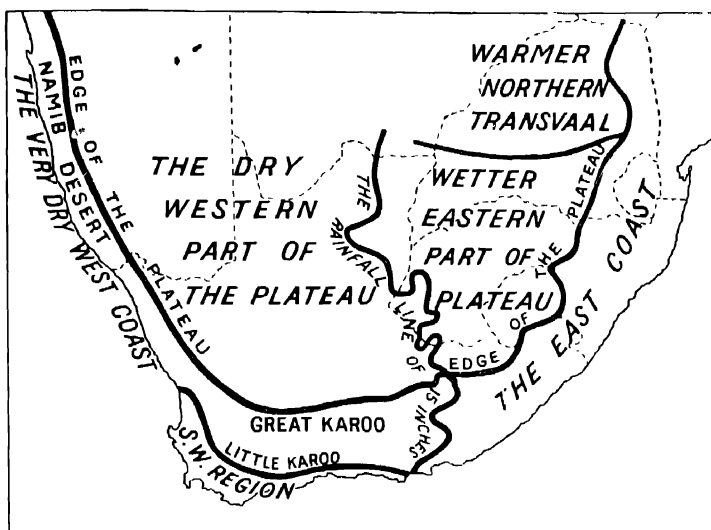
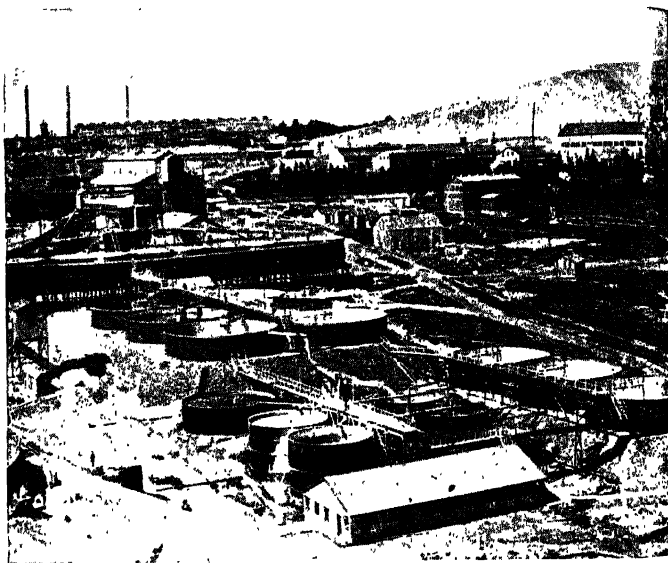


FIG. Af.16.—The Union of South Africa: natural regions.

of temperature greater than near the coast. The vegetation is a poor scrub, and the main industry is sheep farming. But the vegetation is often so poor that four to ten acres have to be given to each sheep. Around Oudtshoorn, on the Little Karoo, ostriches were, until recently, extensively reared for the sake of their feathers.

The South-East Coast receives its rain from the Trade Winds, mainly in the summer months. South Africa is in the Southern Hemisphere, so the summer months are November to February. This region is thickly populated by African natives (negroes),

whose principal food is maize and kaffir corn. Indeed, this area includes Zululand—the land of the Zulus. The natural vegetation is a sub-tropical or warm temperate forest. In the warmer regions much sugar-cane is grown, as well as tobacco, but nearly all other crops grown are required to feed the large native population. The climate and products



(Photo: South African Railways Publicity Dept.)

FIG. Af.17.—General view of the Crown Mines, Johannesburg.

One of the largest gold mines in the world. Notice the huge pile of waste sand from which the gold has been extracted. The very fine gold is separated from the ore in the tanks shown in front.

of this region are rather like those of the damper parts of India, and large numbers of Indians have settled here. The two great centres are the ports of East London and Durban. Round these ports there are large numbers of Europeans.

The South-East Highlands. Between the south-eastern coastal plain and the edge of the high plateau there is a hilly

region which occupies the greater part of Natal. Considerable areas are forested, and timber is worked for use in the treeless grasslands. The rainfall is good and there is a large native population, living mainly on maize. Large numbers of cattle and sheep are reared. Good coal is mined near Newcastle and considerable quantities are exported from Durban. The principal town of this region is Pietermaritzburg. The native state of Swaziland lies in this region.

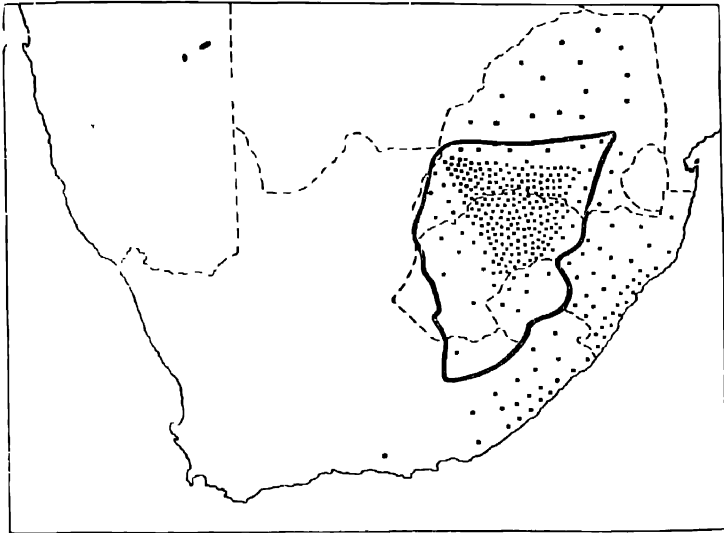


FIG. A1.18.—The distribution of maize.

Each dot represents about 50,000 bags, or 4,500 tons. The thick black line shows the limits of the High Veld. Notice that the "maize triangle" lies in the wetter, eastern parts of the High Veld.

The Veld, or more correctly the **High Veld**, occupies the eastern half of the plateau of South Africa, including the eastern part of Cape Province, the whole of the Orange Free State and most of the Transvaal. The climate gradually gets drier from east to west, and the grassland fades gradually into desert. By far the most important industry is sheep rearing, the sheep being kept for the sake of their wool. The Veld exports the wool to be manufactured into woollen goods

in England. The principal food grain is corn or maize, and large quantities are exported. Naturally maize is grown in the damper parts, where cattle are also reared. Parts of the Veld are very rich in minerals. Enormous quantities of gold are obtained in the Witwatersrand, near Johannesburg. This district alone produces nearly half the world's annual supply of gold. There are extensive coalfields near Johannesburg;

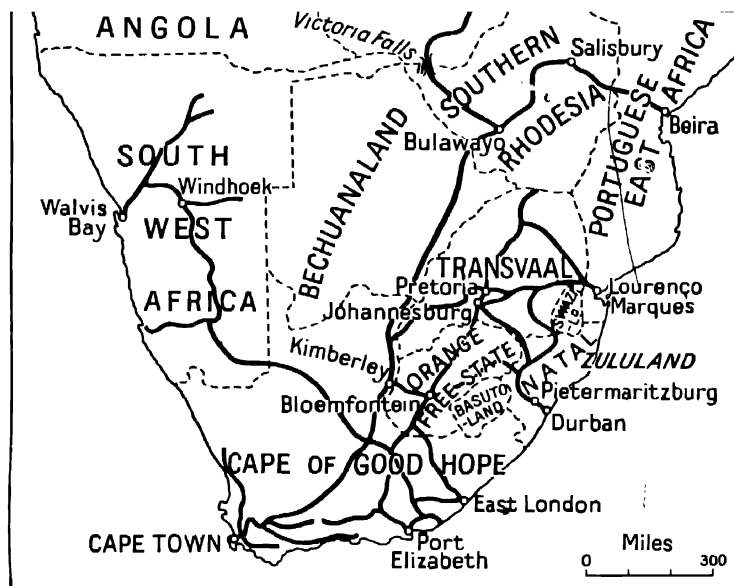


FIG. Af.19.—The railways of South Africa.

Study this map carefully by taking each port in turn, notice the railway running from it to the interior and the part of South Africa served by each port. The railway disappearing at the top of the map—across the wonderful bridge at Victoria Falls, on the Zambezi—extends through Northern Rhodesia to the Congo.

some of the coal is exported through the port of Lourenço Marques. The great diamond mines of Kimberley are on the western borders of the Veld, where it begins to pass into the desert. Diamonds are also found near Pretoria. Now South Africa produces a quarter of the world's uranium ores.

In the north of the Transvaal the Veld begins to slope gradually northwards towards the Limpopo River. The

banken or slopes are hotter than the high plateau, and round Pretoria much maize, fruit, cotton, and tobacco are grown. Instead of grass, scrubland is found, and the Northern Transvaal is really a separate natural region—part of the great Savana or Tropical Grassland of Africa. The land near the Limpopo is unhealthy.

Johannesburg and *Pretoria* are the principal towns of the Transvaal, and centres both of the mining and agricultural districts. *Bloemfontein* is the principal town of the Orange

EXPORTS

G O L D				WOOL	DIAMONDS	FRUIT	OTHERS
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FOOD AND DRINK	RAW MATERIALS	MANUFACTURES					
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IMPORTS

FIG. Af.20.—The trade of South Africa. The total trade is very roughly one-eighth that of the United Kingdom.

Free State. Notice that the natural outlet of the Transvaal is through Portuguese East Africa to the port of Lourenço Marques, or to the Natal port of Durban. The Orange Free State is served by the ports of East London and Durban as well as by Port Elizabeth and Cape Town.

The Desert and Semi-Desert Regions are sparsely populated. They cover not only the western half of the plateau of South Africa, but extend also to the west coast. Where there is a little grass sheep can be kept, and the natives of Bechuanaland wander about with their herds of cattle, sheep, and goats. In good years maize and kaffir corn can be grown. It is believed that the climate of South Africa is getting drier, and that this region used to be much richer than it is now. On the surface of the plateau are many "salt pans"—shallow salt lakes often dry for a great part of the year. The principal port on the

west coast is Walvis Bay, and the chief town Windhoek, but they are not very important. Diamonds are worked in the coastal regions.

Railways of South Africa. Notice carefully the railways shown on the map, and the hinterlands of the chief ports. Many motor roads now exist and the place of the once famous ox waggon with its span of sixteen oxen has been taken by the motor-lorry or truck.

Trade of the Union of South Africa. By far the most important exports are gold and wool. The imports are manufactured goods, but South Africa has now developed many manufactures, including iron and steel.

THE RHODESIAS AND NYASALANI

The British Federation of Northern and Southern Rhodesia and Nyasaland is four times the size of the British Isles. It lies on the African Plateau, but there are lowlands along the great rivers such as the Limpopo and Zambezi. At present there are fewer people in the Federation than there are in Greater London. But the land is very suitable for agriculture, fruit farming, cattle and sheep rearing, and great progress is being made. Water power is being developed at the Kariba gorge of the Zambezi.

Southern Rhodesia is the more developed. Although it lies in the tropics, the elevation of the plateau tempers the climate and much is suitable for white settlers. At present there are less than 200,000 white people including the two chief towns of Salisbury and Bulawayo. Coal is obtained at Wankie and sent to the Katanga mining district of the Belgian Congo. Cattle are reared and much tobacco is grown.

Northern Rhodesia is more tropical and mining (especially of copper ores) is more important than farming though some foodstuffs are sent to the Belgian Congo.

The nearest outlet of Rhodesia is through the Portuguese port of Beira. Parts of Northern Rhodesia suffer from the tsetse fly, whose bite is fatal to cattle and horses. The tsetse fly belts are great obstacles to development and progress.

The federation of the Colony of Southern Rhodesia and the Protectorates of Northern Rhodesia and Nyasaland came into existence in 1953. Salisbury is the capital of the Federation.

The Cape to Cairo Railway. Many years ago Cecil Rhodes, a great pioneer in South Africa, planned a railway which should run from South Africa (Cape Town) to North Africa (Cairo), if possible through British territory the whole way. It is not finished; indeed, large parts have never been planned in detail. A direct railway runs from Northern Rhodesia to Cape Town, crossing the great river Zambezi by a wonderful bridge at the Victoria Falls. In North Africa it is possible to travel from the southern borders of the Sudan to Cairo by river steamer and train, but between Northern Rhodesia and the Sudan there are still several gaps with neither railway nor river routes. In the dry season motor cars can go all the way from Cape Town to Khartoum, in all weathers as far at least as Nairobi.

ANGOLA

Angola is about four times the size of the British Isles, and contains a population of about 4,000,000. It has been a Portuguese possession since 1575. There are huge areas of good grassland on the plateau, and one day cattle rearing may become important. A railway—the Benguela railway—has been built from Lobito Bay into the heart of Africa, and Lobito has become a big “side door” into Africa. The capital, also a port, is Loanda.

THE BELGIAN CONGO

The Belgian Congo occupies the greater part of the basin of the great Congo River. The basin forms a saucer-shaped depression in the surface of the plateau of Africa. The floor of the “saucer” is about 1,000 feet above sea-level. The Congo and many of its tributaries rise in the south on the high plateau of South Africa. The main river drops into its basin by a series of rapids or falls, and flows northwards as a navigable waterway as far as the Stanley Falls. From the Stanley Falls the river swings westwards and is navigable as far as Stanley Pool. Then the river drops rapidly by a series of rapids to the coast. Compare this with the River Nile. The equator passes

through the Congo Basin, and so the basin has a high temperature with heavy equatorial rains. All the lowlands are covered with dense evergreen forests. The highlands surrounding the basin, and sometimes the ridges between the rivers, are covered with savana or grassland.

The Forest is thinly peopled, because it is difficult to cut down the dense forest even to grow a few crops. It is in these

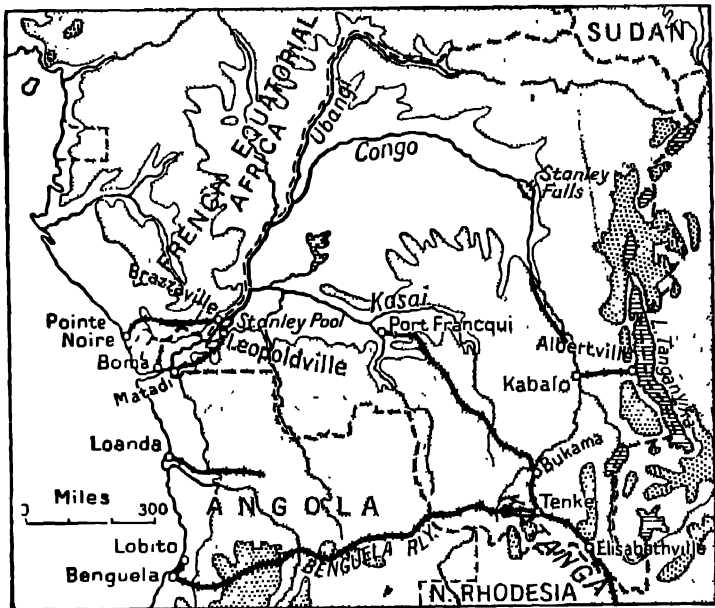


FIG. Af.21.—The Belgian Congo.

Land over 1,500 feet, light dots; highlands over 5,000 feet, heavy dots. Note carefully the railways.

dense forests that the pygmies live. They are amongst the least civilised human beings. Elephants are numerous in the forests and ivory is still an important product. Many trees in the forests yield rubber, but early traders in their greed to get rich quickly, cut down instead of systematically tapping nearly all the rubber trees which could be reached easily. The oil palm yields palm oil and palm kernels used in soap making,

and is cultivated in places. Copal is a sticky substance, rather like resin, obtained from certain trees.

Katanga, a portion of the plateau on the south, has become very important because of its rich mineral deposits. Copper is the chief metal, and Elisabethville the chief mining centre. Coal and food for the miners are obtained from Rhodesia.

Communications. Notice that Katanga lies right in the heart of Africa. There are at present three main ways in and out. One is by the Benguela railway, another is by railway through

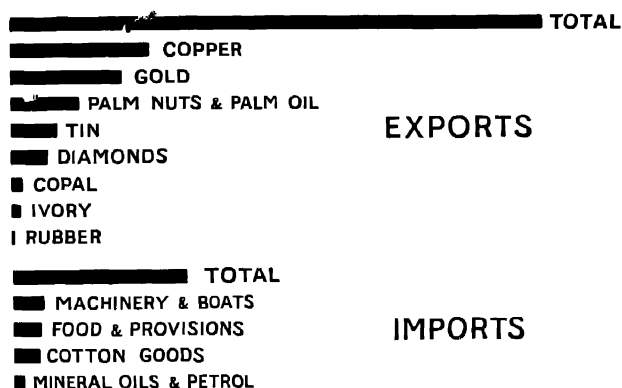


FIG. Af.22.—The trade of the Belgian Congo.

Compare this with the trade of other equatorial countries such as Malaya. The diagram is drawn on the same scale. Diamonds and cotton are also important exports.

Rhodesia to Beira, the third is across Lake Tanganyika and Tanganyika to Dar-es-Salaam. There is a fourth route—by the Congo.

Study Fig. Af.21 carefully, and notice how railways have been built where there are rapids on the rivers. One is from the port of Matadi to Leopoldville; another is round the Stanley Falls; a third runs from the Katanga to the Kasai river. Notice the short railway joining the Congo and Lake Tanganyika.

Trade. The Belgian Congo is developing rapidly. Many towns, such as the capital Leopoldville and Bukavu, have fine modern buildings. Fig Af.22 shows the principal items of foreign trade.

WEST AFRICA OR THE GUINEA COAST

From Cape Verde in latitude 15° N. to the mouth of the River Congo in latitude 6° S. is roughly 3,000 miles. Along this coast there are four areas of the British Commonwealth, seven strips of French territory, a Portuguese colony, a Spanish colony, and a Negro republic. All these small countries have certain things in common. They may all be divided into two parts.

(1) *The Coastal Plains* have a heavy rainfall. The rain falls mainly in the summer months, but the climate is hot and damp all the year. The natural vegetation is evergreen forest of equatorial type in the wetter parts, deciduous forest in the drier. Mahogany, ebony and other hard timbers are obtained from the forest, but more important is the oil palm which is cultivated and from which palm oil and palm kernels are obtained and exported. Wild rubber is collected, and rubber plantations have been started in many places. In some parts (Ghana, Nigeria, island of São Thomé) much cocoa is produced from the beans of the cacao tree. The favourite foods of the people are yams and manioc (cassava) though some maize and rice are eaten and much palm oil used in cooking. Notice, too, that on the west coast of Africa the oil palm has taken the place of the coconut.

(2) *The Plateau Regions* have a smaller rainfall and poorer soil, the natural vegetation is savana. The crops grown are mainly a type of millet called Guinea corn, maize and cotton. Ground-nuts (pea-nuts) yield food and oil and are an important export. During the dry season a dust-laden wind known as the "Harmattan" often blows from the north-east from the Sahara Desert and may do much harm, and this season is very hot. The old hard rocks of the plateau are sometimes rich in minerals. Much tin ore is obtained from Nigeria, gold and manganese from Ghana, iron ore and diamonds from Sierra Leone. Coal is mined in Nigeria.

Gambia is a small British colony, producing ground-nuts.

Sierra Leone is also a British colony. Its capital, Freetown, has a good harbour and is a coaling and oiling station.

Ghana is the name taken by the Gold Coast when it became an independent member of the British Commonwealth in 1957.

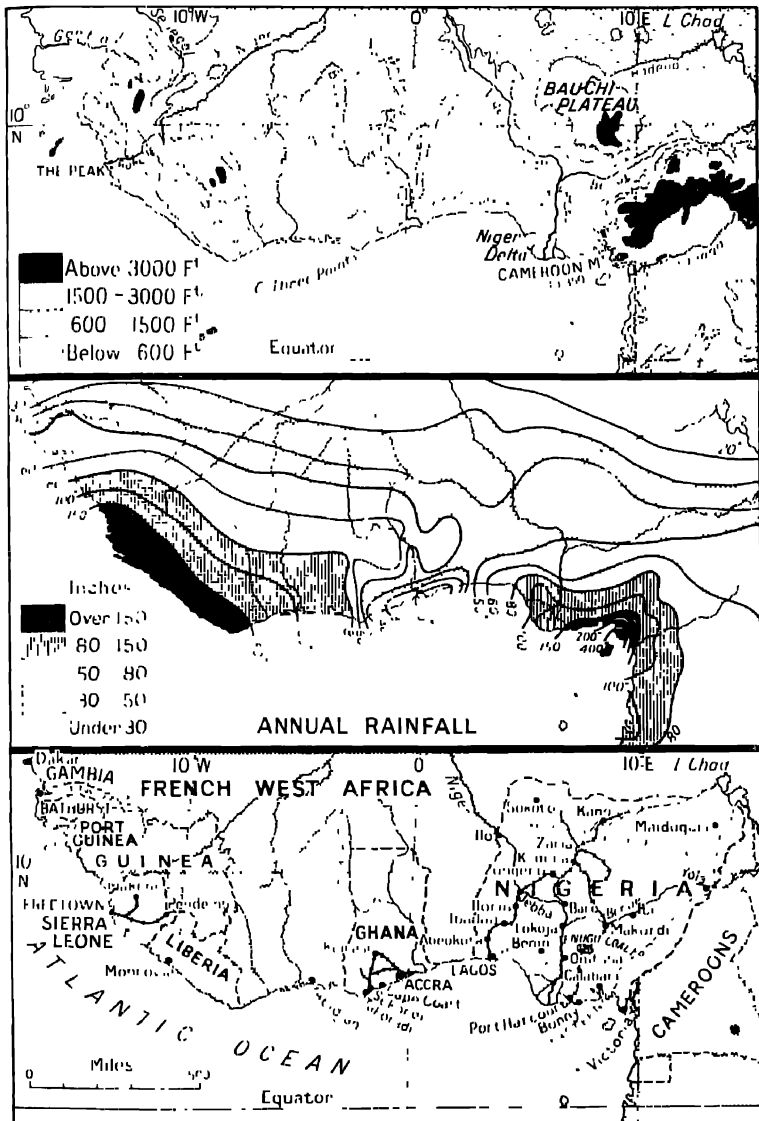


FIG. Af.23. —The West Coast of Africa.

Some parts of French West Africa notably former French Guinea in the west have now become independent

There are railways from the coast town of Accra to Kumasi, and also from the fine modern harbour of Takoradi. Ghana produces a third of the world's cocoa.

Nigeria is the largest British area: it is a federation of Northern, Western and Eastern Nigeria with a capital at Lagos, also an excellent port. Lagos is on an island in a lagoon, but from the mainland opposite a railway runs inland through the large town of Ibadan with its University College to the plateau region, including the great market town of Kano. The tin-mining area around Jos is also served by the eastern railway which reaches the coast at Port Harcourt.

Liberia is a republic which was founded for negro slaves liberated from America. It is still in a backward state, but has some important rubber plantations run by an American company.

French West Africa is a very large area with products resembling those of the neighbouring British territories.

THE SAHARA

The Sahara (meaning desert) of northern Africa is a vast sandy or rocky waste, without trees or grass, and forms the largest desert in the world. Scattered over the desert in hollows are oases. Wherever water is available, an oasis is sure to occur. Some of them consist simply of a few palm trees clustered round a well or pool, others are quite large tracts of grassland or scrubland where cultivation is possible. The inhabitants of the Sahara consist of:

- (1) The inhabitants of the larger oases.
- (2) The Arab traders who boldly cross the desert by means of camel caravans.

Across the vast desert are caravan routes which are followed by the traders and their camels. The greater part of the desert is nominally French territory and the French have organized motor routes across the desert. Along the north and south of the desert are trading stations where the Arab traders sell their goods to the people of the savanas or the people of the Mediterranean States. In the south are Timbuktu, near the River Niger, and Kano in Northern Nigeria. In the north are several places now joined by railways with the Mediterranean coast.

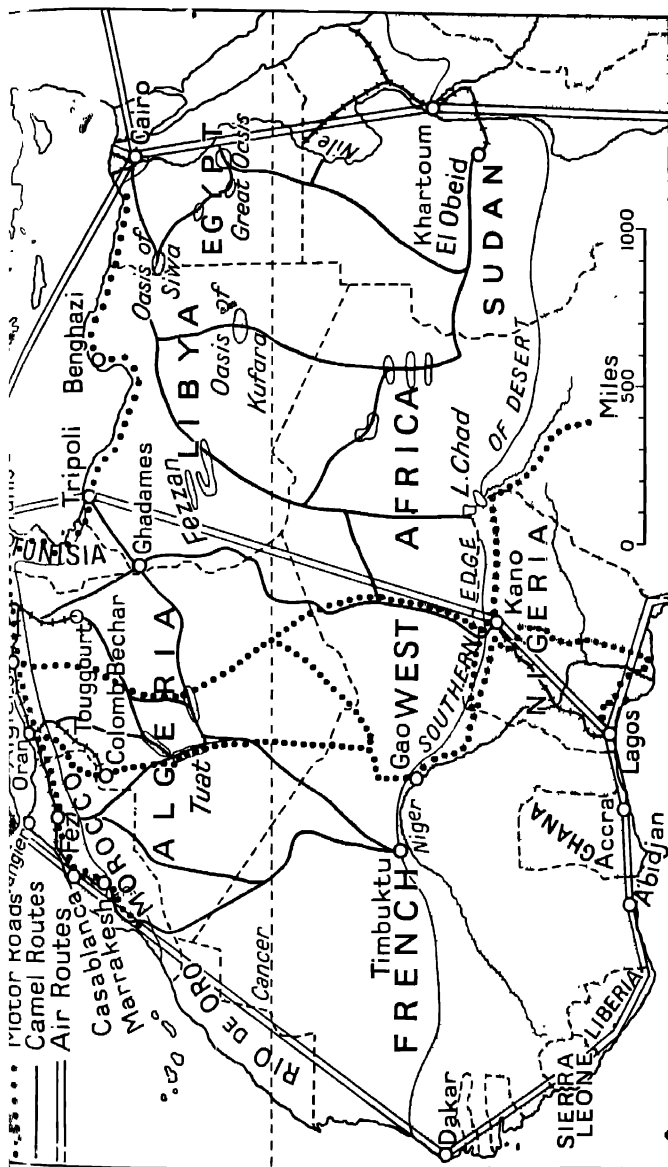


FIG. Af.24.—The camel caravan routes across the Sahara.

The desert is left **white**, savanna or forest lands on either side dotted. If a camel caravan travels 40 miles a day, how long would it take to get from Timbuktu to Tripoli?

The plain lines are the old camel caravan routes; the dotted lines show the modern French motor-routes, the double lines are the British and French air-mail routes. Notice that air routes are constantly changing.

The north-eastern part of the desert, Libya, was Italian territory until the Second World War; the eastern part will be described under Egypt. Most of Libya is desert but some rain falls in the coastal areas and the Italians spent much money trying to develop the country and settle colonists there. This is the country which became so well known as the battleground between Italians and Germans on the one hand and Commonwealth forces on the other in the Second World War. It was granted independence as a kingdom in 1950-51.

NORTH AFRICA

That part of North Africa which enjoys a Mediterranean climate is divided between three states, Morocco, Algeria, and Tunisia. These countries are still sometimes known by the old name of the Barbary States. Today, however, Berbers form only a minority of the population; Arabs are more numerous. Running through the three countries are the mountain chains of the Atlas. Fig. Af.25 shows roughly the arrangement of the main ranges. Notice that the states fall into three parts:

- (a) The coastal strips.
- (b) The plateau between the main chains of the Atlas.
- (c) The Sahara plateau.

The rain-bearing winds of the cold season come from the west so Morocco, on the west, enjoys the best rainfall.

MOROCCO

Morocco is an old Mahommedan Empire, mainly under the protection of France until it became independent in 1956. In the north, Ceuta (opposite Gibraltar) belongs to Spain, and the main port of Tangier was long international—controlled by Britain, France, Spain and other Powers.

The Coastal Plains are fertile; barley, wheat, and maize are widely grown. Large numbers of Mediterranean fruit trees also exist—olives, vines, figs, oranges, etc. Numerous cattle are reared. Nearly one-half of the people of Morocco live in this fertile plain. Casablanca is the chief town and

port, Rabat and Fez important trading centres. Behind the coastal plain; but before one reaches the Atlas mountains, is a low plateau called the Meseta. Except near the hills, where there is water for irrigation, it is too dry for crops, but there are large numbers of sheep and cattle. On the Meseta is Marrakesh (or Morocco), an important market.

The Atlas Mountains and Enclosed Plateaus. The mountains are in part covered with forests of cork-oak, cedar, etc. The plateaus are of little use except as sheep and goat pastures.

The Saharan Plateau has a number of oases with date-palms.

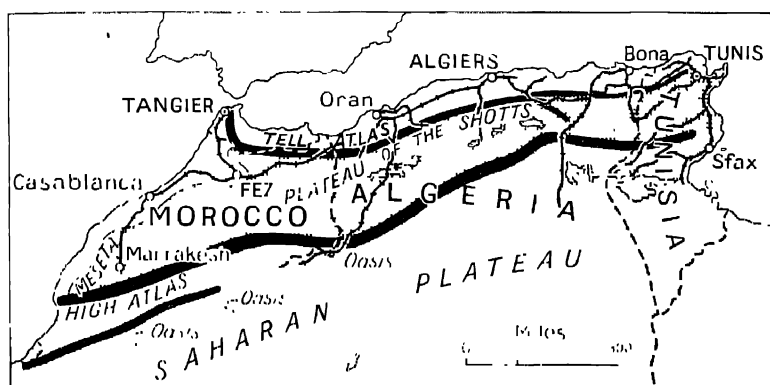


FIG. Af.25.—The Mediterranean or Barbary States of Africa.

Morocco is still a backward country, but is likely to advance and is believed to be rich in minerals. They provide a third of the value of all the exports, far and away the biggest item being phosphate rock (for manure). Foodstuffs, especially wheat, barley, citrus fruits, and fish provide a still bigger proportion of the value.

ALGERIA

Algeria is French territory and has developed rapidly under French influence.

The Coastal Strip, lying between the crest of the mountains and the sea is the most important part of the country. The

valleys and plains have good soil, but usually require to be irrigated. Large quantities of wheat and barley are grown, as well as the vine and various fruits. The progressive farms are mainly owned by Europeans. The hills are covered with forest or scrub forest, the most important trees being cork-oak, pine, and cedar. The higher parts of the hills are suitable for sheep. After wine, sheep form the chief export of Algeria. Along the coast sardine fisheries are important. The principal towns and ports are Algiers and Oran.

The Plateau between the Tell and the Saharan Atlas is known as the Plateau of the Shotts, a shott being a shallow lake which dries up in the hot season. The plateau is covered with poor grass on which feed many sheep and goats. The inhabitants are nomads, and move about with their flocks in search of pasture. The alfa grass is used for paper making.

The Sahara has several oases, and the French have sunk artesian wells and made it possible to extend the fertile area. The great product is the date, obtained from the date-palm. Some very rich oilfields have been discovered and are being developed, especially on the Libyan border.

Iron ore and phosphate are mined in Algeria, and other minerals in smaller quantity. The French have built a number of railways and roads and developed the country, so that its export trade (wine, sheep, wheat, tobacco, and minerals, is nearly half as much again as that of Morocco. The trade is mainly with France.

TUNISIA

Tunisia, like Morocco, was a French Protectorate until it became independent in 1956. It forms a continuation eastwards of Algeria and may be divided into the same regions, but the Plateau of the Shotts is much narrower. The agricultural and mineral products are similar to those of Algeria.

The principal town is Tunis, near which are the ruins of Carthage. Carthage was a powerful city in the days of the Roman Empire, 2,000 years ago.

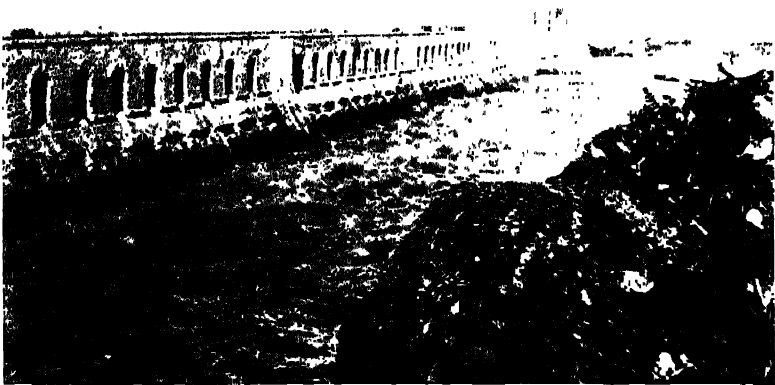
THE BASIN OF THE NILE (Egypt and the Sudan)

THE RIVER NILE

The Nile is one of the world's greatest rivers. The main river, which flows through Egypt, is formed by the union of two branches, the White Nile and the Blue Nile. The White Nile rises in the Lake Victoria on the high plateau of East Africa. Lake Victoria is right on the equator, and so receives a good rainfall nearly all the year round. Flowing northwards the Nile drops by a series of rapids and waterfalls till it reaches the flat plain known as the Bahr-el-Ghazal. For nearly a thousand miles through this plain, from Rejaf to Khartoum, the White Nile is navigable. The plain is so flat that large areas are covered with marsh and the Nile is joined by many streams, of which the largest is the Bahr-el-Ghazal. This plain lies in the Tropical Climate or Savana Region, with rain in the summer. The Blue Nile rises in a small lake in the midst of the Abyssinian Mountains. In summer the snows on the high mountains melt and heavy rain falls, so that the Blue Nile comes down in flood at the end of the summer, in August or September. Thus the White Nile is a constant stream; the Blue Nile has a flood season and a low-water season. The two rivers join at Khartoum and enter the Desert Belt. Below Khartoum the Nile commences a long descent to sea-level. For more than 800 miles the river is interrupted by a series of six rapids known as cataracts, and so cannot be used by steamers. Near Halfa is the second cataract, and the Nile enters Egypt; at Aswan is the lowest or first cataract, and the Nile enters its famous valley through Egypt. From Khartoum right to the sea the Nile flows through the Desert Region. Egypt would be nothing but a desert if it were not for the water of the Nile. Remember, then, that the White Nile rises on the African Plateau in Uganda, but for the greater part of its course flows through the Sudan; the Blue Nile rises in Ethiopia or Abyssinia, but flows for 300 miles through the Sudan. Only about one-fourth of the course of the Nile is in Egypt.

THE SUDAN

Until 1953 the Sudan was a condominium, its government shared by Britain and Egypt and it was known as the Anglo-Egyptian Sudan. In 1956 it became independent. South of Khartoum both the White and Blue Niles flow through fertile alluvial land with temperatures suited to cotton and many other



[Photo. The Sudan Government.]

FIG. At.27.—The Sennar Dam, Sudan.

This dam has been constructed across the Blue Nile and is enabling huge areas of cotton-growing lands to be irrigated

crops. The rainfall is small, but water from the rivers is available for irrigation. The Sudan has an area of more than 1,000,000 square miles—roughly a third the size of the United States—but at present has only 9,000,000 people. At the end of 1925 the great Sennar Dam across the Blue Nile was completed, and a large area of land south of Khartoum is now irrigated and planted with cotton. The principal town of Sudan is Khartoum, at the junction of the White Nile and

the Blue Nile. It is connected with Port Sudan, on the Red Sea, by a railway. The Sudan exports cotton, gum arabic (obtained from a small tree growing on the savana), and millet. In 1924 the value of the raw cotton exported from Port Sudan was only one-fiftieth of that of India, but in 1931 it had risen to nearly one-tenth, showing the immediate effect of the new irrigated lands. Opposite Khartoum is the large town of Omdurman occupied almost entirely by Sudanese.

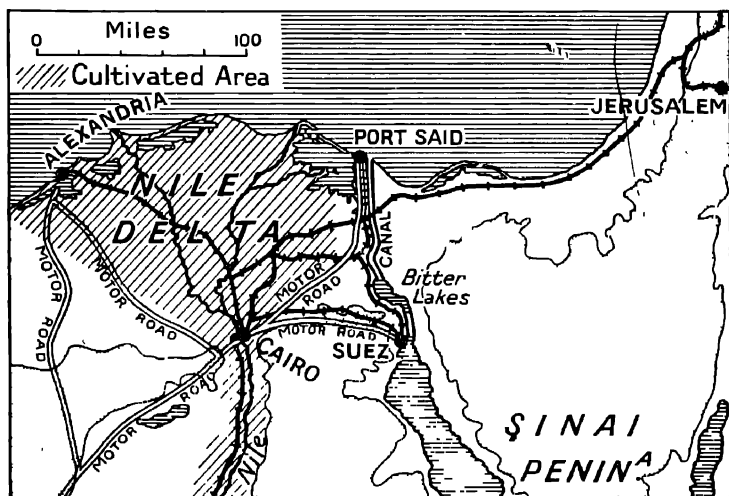


FIG. A1.28.—The Suez Canal.

Land over 600 feet. dotted. Notice that there is no high land near, and so there are no locks on the canal. The highest land passed through is only 50 feet above sea-level.

EGYPT

Egypt is an independent republic¹. Most of the country is a desert, and it is three times the size of the British Isles. Running through the centre of the country, from south to north, is the Nile. The Nile Valley is a flat-bottomed valley, about 10 miles wide and bounded by cliffs on either side. The only really useful parts of Egypt are the Valley and Delta of the Nile—the total area of the useful land is only 12,000 square miles, or less than half the size of Scotland. England is a densely populated country; it has 650 people to the square

¹ In 1958 the union of Egypt and Syria was announced under the title of the United Arab Republic

mile. But the Nile Valley in Egypt has over 1,000 people to the square mile—a large proportion of them peasant cultivators.

Fertile Egypt falls into two parts:

(a) The Nile Valley, or Upper Egypt.

(b) The Nile Delta, or Lower Egypt.

Upper Egypt. In the old days Upper Egypt used to be made fertile by the annual floods of the Nile, which spread a layer of fine silt as well as water over the land. The valley was divided up into a number of compartments rather like rice-fields with high banks. This prevented the water flowing quickly, and was called basin irrigation. Now the valley is irrigated by canals from the great dam at Aswan.

Lower Egypt is also watered by canals. It is on the borders of the Mediterranean and gets a little rain in winter.

The principal export crop of Egypt is cotton, and Egyptian cotton is a very fine variety. The great food crops grown in the summer are maize, rice and sugar-cane; wheat, barley and beans, with fodder, are important winter crops.

Cairo is the capital and largest town in Egypt. It is situated at the head of the delta, on the borders of Upper and Lower Egypt, and so was a convenient centre from which to govern the whole of the long, narrow country. Egypt has a long and wonderful history; it was a great country 5,000 years ago. Every year Egypt is visited by large numbers of tourists who come to see its old ruins, especially the Pyramids which are near Cairo.

Alexandria is the principal port; but it suffers from mud filling up the channels. Raw cotton forms nearly two-thirds of the exports of Egypt; cotton seeds are also exported.

Egypt cannot grow enough food for her big population and imports foodstuffs as well as coal, cotton goods, and iron and steel manufactures. She imports much rice. Notice from the map the communications of Egypt, especially the way in which the railways have been built where the river cannot be used.

The Suez Canal lies in Egyptian territory. It cuts through a flat strip of desert, the isthmus between Egypt and Sinai. The canal is roughly 100 miles long, but part of that distance is through the Bitter Lakes. At the northern end is Port Said, on the Mediterranean; at the southern end is Suez, on the

Gulf of Suez. The canal was built by a French engineer named De Lesseps, and finished in 1869. It has been repeatedly widened and deepened since then, but the largest ships cannot pass through the canal, and the steamers which travel between India and Europe are not as large as some which cross the Atlantic. The land is so flat on either side that there are no locks. The Suez Canal was owned by the Suez Canal Company, in which the British Government had shares, other shares being held by the French. Trouble was caused in 1956 when the Egyptians seized the canal, declaring it to be national property. Nearly 15,000 steamers passed through canal in a year, a third of the tonnage being British.

ETHIOPIA OR ABYSSINIA

The wild and undeveloped country of Abyssinia or Ethiopia, consisting mainly of a mass of mountains, was annexed by Italy after the war of 1935-36 but restored to independence in 1941. The people are very 'backward, and as yet there are few schools. The chief town, Addis Ababa, is connected with the French port of Jibuti by the only railway in the country but the Italians built a number of roads during their occupation. The source of the Blue Nile lies in Abyssinia in Lake Tana. The eastern lowlands of the country are largely desert, but the land amongst the mountains could be greatly developed agriculturally. Between Ethiopia and the Red Sea is the former Italian colony of Eritrea, with the town of Massawa, now linked with Ethiopia.

SOMALILAND

Turn again to Fig. Af.8, and notice that the great desert of Northern Africa stretches round the mountain mass of Abyssinia and occupies the eastern projection of Africa, sometimes called the Horn of Africa. This is divided between French, British, and former Italian Somaliland. It is mostly waste or scrubland inhabited by nomads with herds of camels, sheep, and cattle. Jibuti, the port of French Somaliland, has already been mentioned. In 1950 the Italians were allowed to take charge again under Trusteeship for the United Nations of the colony, now known as Somaliā, they lost during the Second World War.

EAST AFRICA

That part of Africa which is usually called East Africa consists physically of two parts:

(a) A portion of the great high plateau of Africa, the region round the great lakes.

(b) The coastal lands between the plateau and the sea.

East Africa is divided between the British Colonies or Protectorates of Uganda, Kenya, Tanganyika and Zanzibar, and the Portuguese Colony of Portuguese East Africa. Tanganyika was a German colony before the war of 1914–1918 and afterwards was mandated to Britain. Look carefully at Fig. Af.29, and notice that Uganda, Nyasaland, and most of Tanganyika lie on the plateau including the great rift valley; Kenya is half on the plateau and half on the coastal lands; Portuguese East Africa is entirely on the lowlands of the coast.

The Coastal Lands. These lands lie entirely in the Tropics and are therefore hot. They may be sub-divided into two parts:

(a) The coastal plain, hot, wet, often unhealthy and fringed with mangrove swamps and other forests. Coconuts grow along the coast and copra is exported. This region is also suitable for rubber and sugar-cane. The island of Zanzibar (a British protectorate ruled by a Sultan) is famous for cloves. Rice is the principal food grain. Along the coast are several ports which serve as the gateways into the interior. There is Mombasa in Kenya, Dar-es-Salaam in Tanganyika, and Beira in Portuguese East Africa. The extreme south of Portuguese East Africa lies outside the Tropics, and the port of Lourenço Marques is the main outlet for the British territory of the Transvaal.

(b) A hilly region (between the coastal plain and the plateau), which is drier, has a poor soil and is of relatively little use.

The Plateau. Owing to its great height above sea-level—usually from 3,000 to 6,000 feet—the plateau has a cool and pleasant climate suitable for Europeans. Many parts have a rich volcanic soil and a moderate rainfall. The chief food

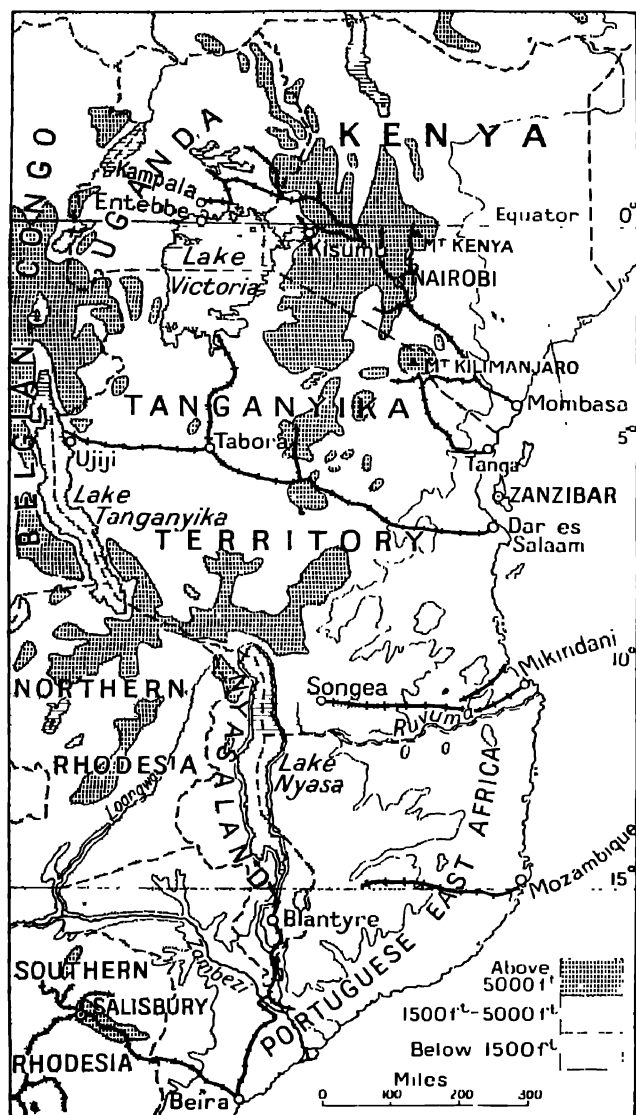


FIG. Af.29.—East Africa.

Where the railway is shown touching Lake Victoria the waters of the lake spill over the Owen Falls into the Victoria Nile and a great power station has been built and a new town, Jinja, is growing up. The railway now extends to western Uganda.

crop is maize, but the principal crop grown for export is cotton. Large quantities are exported from Uganda, Kenya, and Tanganyika. Coffee and sisal hemp (a strong fibre for rope making) are also important. The plateau is also very suitable for cattle.

Uganda, Kenya, and Tanganyika are developing steadily and likely to become important countries in the near future, especially as producers of cotton. Portuguese East Africa is slow in developing. In 1948-49 a large scheme was put in hand to clear the scrubland round Songea (Fig. Af.29) for the

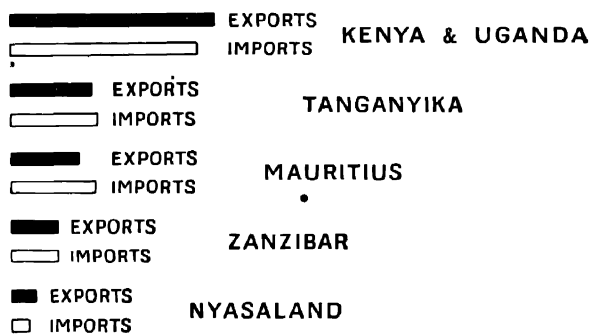


FIG. Af.30.—The trade of East Africa.

This diagram is drawn on the same scale as the ones to the Congo, China, etc.

production of ground-nuts, and other crops. To open up the country a railway was built to the coast and a new port at Mtwara near Mikindani. Except the ports, there are few towns of any size yet in East Africa. An important one is Nairobi in Kenya. At Makerere, near Kampala, the chief town (though Entebbe is the capital) of Uganda, has been established the University College for East Africa. Zanzibar, on the island of Zanzibar, is a great trading centre, as well as an old port.

Notice carefully the railways to the interior. On the plateau the lakes form the chief means of communication. Southern Nyasaland is linked by railway across the Zambezi with Beira and is thus more closely associated with the Rhodesias than with East Africa.

Fig. Af.30 shows the trade of the different countries.

ISLANDS OF AFRICA

Madagascar is a large island with a plateau in the centre. Dense forests which produce a little rubber are found on the east. It is a French possession. Hides are exported, but the island is little developed.

Mauritius, in the Indian Ocean, is a British possession and a port of call (the port is called Port Louis). It grows cane-sugar, most of which is sent to Britain. Near by is the French island of *Réunion*.

St. Helena and **Ascension** are tiny volcanic islands in the Atlantic Ocean belonging to Britain.

Canary Islands (Spanish), **Azores**, **Madeira**, and **Cape Verde Islands** (all Portuguese) lie off the north-west or west coast of Africa. They grow bananas and other fruit for export to England and the continent of Europe.

QUESTIONS AND EXERCISES

1. Compare and contrast the Congo Basin with the Ganges Basin with regard to position, physical features, climate, vegetation, and products.
2. Write an account of the people of Africa, mentioning the various races and where they live.
3. Compare the Nile and the Murray Basins.
4. Describe the railways of Africa.
5. What is meant by the "swing of the wind systems"? What effect has it on the climate of Africa?
6. Describe a journey by caravan from Tunis to Timbuktu.
7. Describe fully the high plateau of South Africa.
8. Compare and contrast Abyssinia with the Australian Alpine area.
9. Write an account of the mineral wealth of Africa.
10. Draw a sketch-map showing the British Empire in Africa.
11. Why do you think large numbers of Indians have emigrated to Africa?
12. If you were to be made governor of part of Africa, which part would you choose, and why?
13. Compare the grasslands of South Africa with those of Eurasia. In what ways do they differ?
14. What would be the advantages of the Cape-to-Cairo Railway?
15. What do you know of the cotton-growing regions of Africa and of their importance?
16. Describe a journey across Africa, from the mouth of the Congo to Durban. Say exactly how you would go.

NORTH AMERICA

POSITION AND SIZE

LOOK first at Fig. N.A.1 and notice the position of some important lines of latitude and longitude. From north to south right through the centre of the continent is the longitude of 100° W. Roughly half the continent lies to the east of this line and roughly half to the west. The Arctic Circle (latitude $66\frac{1}{2}^{\circ}$ N.) runs through the north of the continent, across Baffin Island and southern Greenland—that is, almost across the broadest part of the continent. Notice how in this latitude America is only separated from Asia by the narrow Bering Strait, and the European island of Iceland is very near Greenland. Very roughly the continent is shaped like a triangle, with the base in the north and tapering southwards. Now look at the Tropic of Cancer, which cuts through the narrow part of the continent. It passes through the tip of the Californian Peninsula, but just misses the tip of the Peninsula of Florida. Latitude 40° N., which passes through the heart of the Mediterranean Sea runs across the United States from the centre of California to New York. Notice that the *whole* of the United States lies outside the Tropics whilst the West Indies are almost entirely *within* the Tropics. One other point is useful—latitude 49° N. marks the boundary between Canada and the United States for a great distance.

North America is the third largest continent next to Asia and Africa. It is nearly eight million square miles in area, and is 6,000 miles from north to south.

PHYSICAL FEATURES

North America falls very simply into three great divisions:
(1) The Western Mountains, or Pacific Cordillera.

(2) The Central Plains.

(3) The Eastern Highlands.

(1) **The Western Mountain System** is a great system of young fold mountains, sometimes enclosing plateaus and basins, and forms part of the great girdle of mountains which surround



FIG. N.A.1.—The position and size of North America.

The British Isles are shown on the same scale and in their correct latitude

the Pacific Ocean. The mountains were raised up at about the same time as the Himalayas and the Alps. The Western Mountain System does not consist of one great range, but of a number⁶ of parallel ranges. In the *north* the ranges are close together but get gradually higher as one goes from the coast

inland. On the west are the fine Coast Mountains, then a series of small plateaus, then the lofty Columbia system, and

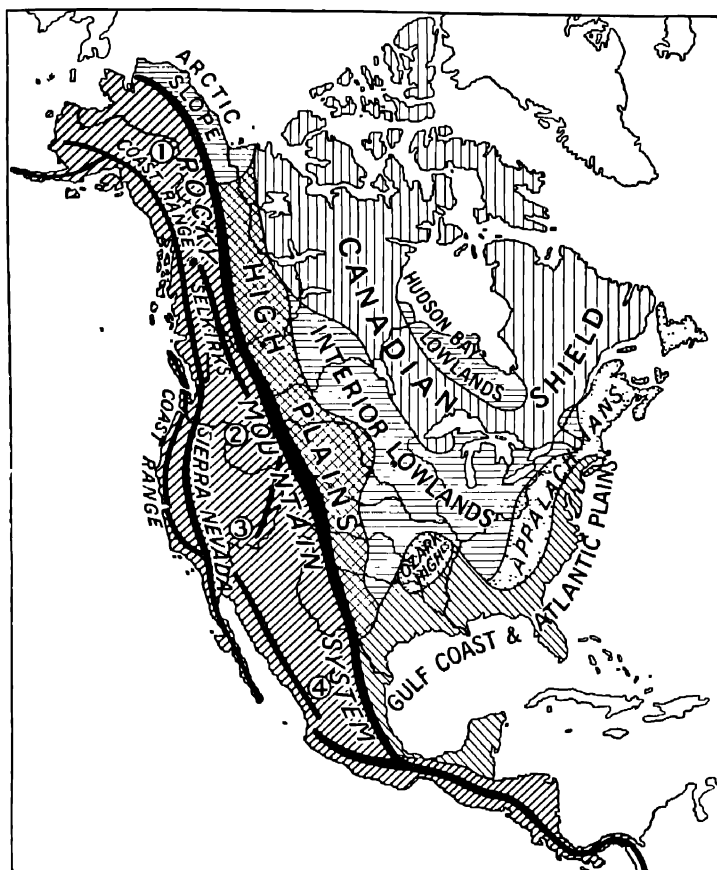


FIG. N.A.2.—The main physical features of North America, showing the physical divisions of the continent.

1=Plateau of Yukon; 2=Columbia Plateau; 3=Colorado Plateau; 4=Plateau of Mexico.

The Arctic Archipelago forms a division more mountainous than the Canadian Shield.

finally the Rocky Mountains themselves. Farther south the whole system gets very much broader, and between the ranges are great plateaus. Along the coast lies the Coast Range,

behind which is the great valley of California. Then come the Cascade Range (north) and the Sierra Nevada. Between the Cascade Mountains or the Sierra Nevada and the main range of the Rocky Mountains themselves lies the region of great plateaus. Passing into Mexico still farther south, the whole Cordilleran System again becomes narrower and passes finally as a single complex chain through the Isthmus of Panama. Follow all these points carefully on Fig. N.A.2. The whole Cordilleran system is sometimes called the Rocky Mountain System but it is better to reserve the name Rocky Mountains for the great easternmost range.

(2) **The Central Plains.** Although the whole of the centre of North America is occupied by land which is nearly flat, or gently undulating, it is not all *lowland*. There are two great areas of lowland, one round Hudson Bay in the north, and one round the Gulf of Mexico. These two lowland areas are nearly connected along the line of the Mississippi and Red rivers and the region of the Great Lakes where the Interior Lowlands are shown on Fig. N.A.2. But westwards the ground rises very gently and gradually, becoming higher and higher until the Rocky Mountains are reached. This is the region of the High Plains.

(3) **The Eastern Highlands.** In the east of North America there are three great highland areas: The high Plateau of Greenland, the old Laurentian Plateau (part of the Canadian Shield), and the Appalachian System of Mountains. The Canadian Shield slopes gradually from a high level in the south-east to the Hudson Bay lowlands. Between the southern part of the Appalachian Mountains and the sea is the important coastal plain.

RIVERS AND LAKES OF NORTH AMERICA

There are two groups of rivers:

(a) Those which drain the Western Mountain System and flow mostly to the Pacific Ocean.

(b) Those which drain the Central Plains and flow to the Atlantic and Arctic Oceans.

The great water-parting is usually formed by the main crest of the Rocky Mountains.

(a) Belonging to the first group are the Yukon in the cold north, the Fraser in Canada, the Columbia with its tributary the Snake, and the Colorado, famous for its canyon, in the United States. Amidst the Rocky Mountains and on the plateaus there are numerous lakes. The largest is the Great Salt Lake of Utah. This lake is in a very dry part of the United States and has no outlet to the sea.

(b) All over the lowlands of the north-east are numerous shallow lakes. In the far north are the Great Slave Lake and the Great Bear Lake which drain by the Mackenzie River into the Arctic Ocean. In the centre of Canada is Lake Winnipeg. Flowing into this lake are the Saskatchewan River and the Red River, and the lake itself has an outlet to Hudson Bay through Nelson River. On the borders of Canada and the United States are the Great Lakes—Superior, Michigan, Huron, Erie, and Ontario, all draining by the St. Lawrence River to the Atlantic Ocean. These lakes form a fine navigable waterway, from the west of Lake Superior to the east of Lake Erie, but farther east, between Lake Erie and Lake Ontario, are the famous Niagara Falls. A canal has been built round the falls, so that the smaller ocean steamers can pass from the Atlantic right into Lake Superior. There have been several schemes for the construction of a ship canal which would permit large ocean liners to reach Chicago on Lake Michigan.

Nearly the whole of the Central Plains in the United States is in the basin of the Mississippi River. Notice the great tributaries of this river—the Missouri, Arkansas, and Red rivers from the west, and the Ohio and Tennessee from the east. The main river flows southwards into the Gulf of Mexico.

Finally we must notice the rivers down the east coast of the United States. They are short, but important, because they have cut gaps through the Appalachian Mountains and the easiest routes from the coast inland are along the river valleys. The most important are the Hudson with its tributary the Mohawk, the Delaware, and the Potomac.

GEOLOGY

The Western Cordillera, like most of the great fold mountains of the world, consists of a great variety of rocks. In some parts valuable ores are found, such as gold in the Yukon, various minerals in the United States, and silver in Mexico. In nearly all parts of the world it is the general rule that oilfields occur on the flanks of great fold ranges such as the Rockies or Andes. This is particularly true of America. The United States, Canada, and Mexico produce nearly half of the mineral oil of the world, and the great oilfields are found on both flanks of the Cordillera—on the west in California and on the east in Texas, Oklahoma, and Alberta.

The whole of the north-east of the continent is formed of a mass of old, hard, crystalline rocks. This area is called the "Canadian Shield" (see Fig. N.A.2), and many parts are very rich in minerals—ores of iron, copper, silver, gold, cobalt, and nickel. The Appalachian Mountains are older than the Rockies, and it is on the western side of them that the greatest coalfields are found—*e.g.* in Pennsylvania, West Virginia, and Alabama. Oilfields are also found on the western flank of these mountains. Underlying most of the Central Plains are much younger and usually softer rocks.

Long after the mountain systems were formed, but many thousands of years ago, North America was much colder than it is now. Nearly the whole of the north of the continent was covered by great sheets of ice. A huge ice-sheet still covers Greenland at the present day. The great ice-sheet which once covered Canada scooped out shallow hollows in the old rocks of the Shield, and so we find all over the north-east of the continent large numbers of lakes, big and small, occupying the hollows made by the ice-sheet. In many places the ice scraped off all the loose soil from the land and crushed up many hard rocks, and so we find large stretches of almost bare rock. The crushed rock was carried southwards and there left behind when the ice-sheet melted. So we find the northern part of the Central Plains is covered with a thick mantle of "glacial drift," which gives place southwards to wind-blown loess. It is the latter which affords extremely fertile soils.

CLIMATE

Temperature. North America is in the Northern Hemisphere, and so its winter is in the same months as Europe. January is usually the coldest month. Look at Fig. N.A.3, which is a temperature map for the month of January. The isotherm of

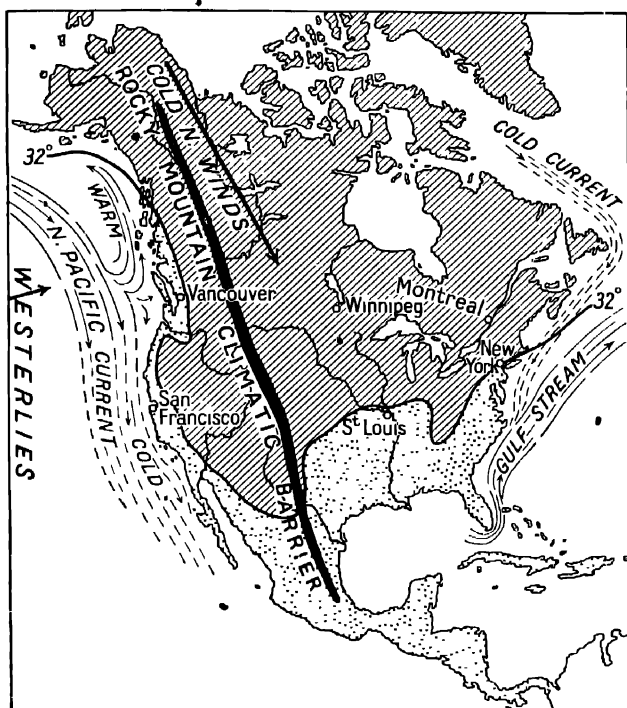


FIG. N.A.3.--The actual average temperatures of North America in January.

32°, or freezing point, cuts right across the continent, so that more than half the continent has a temperature below freezing in January. The line makes a large bend southwards, so that the west coast is much warmer than the east coast. Why should this be? The west coast is kept warm by the influence of the warm North Pacific Drift, a current which flows across the Pacific Ocean from Japan to the coast of British Columbia.

Where this current turns south it is actually a *cool* current, but the air from over it blown to the land is warm. The warm, moist South-Westerlies also blow across the ocean and help to keep the west coast warm, but their warming influence is not felt beyond the Rocky Mountain barrier. Occasionally, however, a warm wind known as the "chinook" (warm

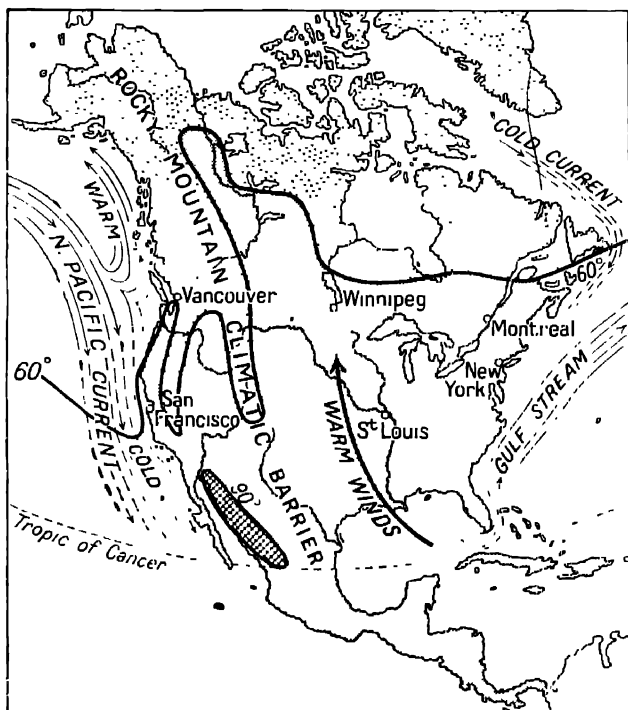


FIG. N.A.4.—The temperature of North America in July.

because it is descending and becoming compressed) blows down from the mountains to the plains, providing a welcome relief from the intense cold. The centre of the continent is very cold because it is far from the sea; icy winds blow from the Arctic regions, and there is no mountain barrier to hinder them. Compare this with Asia, where the mountains run from west to east and prevent the cold northern winds from reaching

India. The east coast of North America feels the moderating influence of the sea a little, but the prevailing winds at this season are from the cold heart of the continent. So New York, although in the same latitude as Barcelona or Rome, has an average temperature below freezing point in January.

Now let us look at conditions in July, when the noon sun is

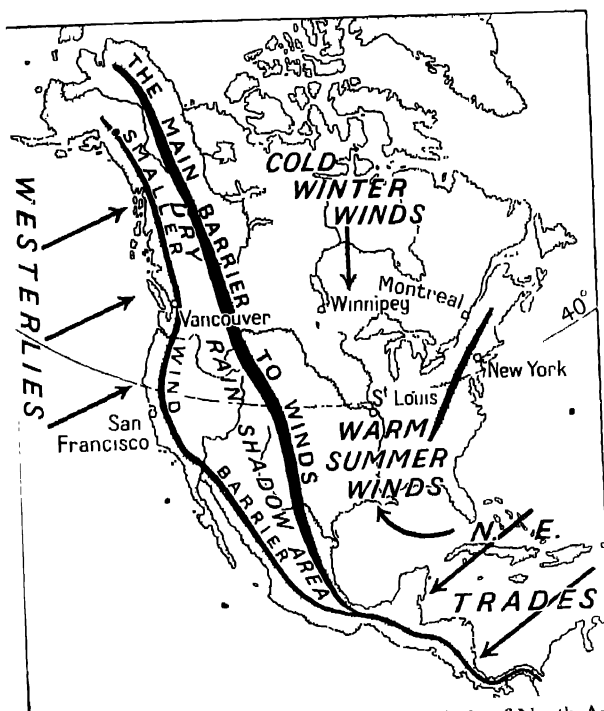


FIG. N.A.5.— The mountain ranges and regular winds of North America.
Compare this map carefully with the rainfall map

shining vertically over Mexico. There is a small area where the average temperature is more than 90° . At this season the west coast is kept cool by the influence of cool winds from off the sea, but the centre of the continent gets very hot. Even as far north as the Arctic Circle the temperature is nearly 60° . On the east coast, the flow of air is mainly from the heated land

towards the sea, and New York is nearly as hot in July as the south-west coast of India.

Winds. A large part of North America, lying in mid latitudes, has its climate and weather controlled by a series of depressions (cf. pp. 50-53). Although the winds in these

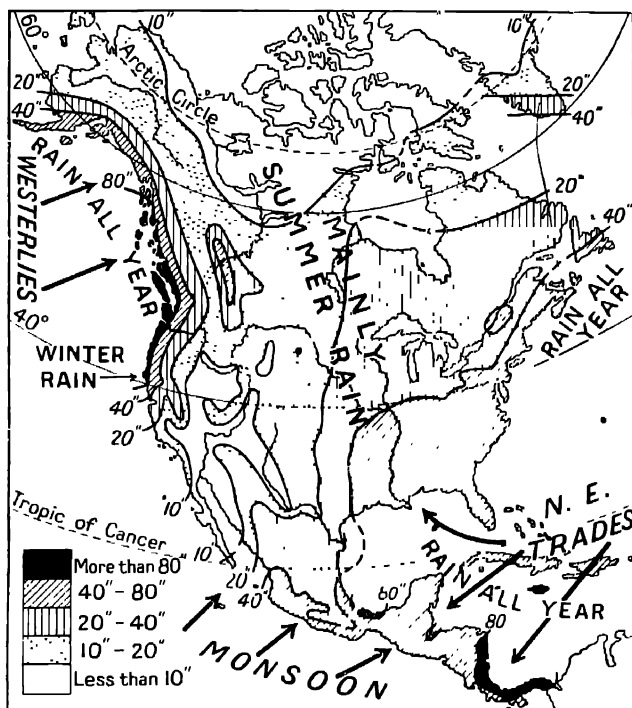


FIG. N.A.6.—The rainfall of North America for the whole year.

Notice very carefully the good constant rainfall where the Westerlies and the Trade Winds are blowing for the whole year. Notice the dry plateaus between the main crest of the Rockies and the coastal ranges (rain-shadow area). Notice how the rainfall decreases from the Atlantic coast inland.

systems blow from all points of the compass, the dominant direction is south-westerly, as in Britain, and so, as in Britain, the position of the main mountain ranges on the western side of the land mass very greatly influences the distribution of rainfall (cf. Fig. N.A.5 and N.A.6).

South of about latitude 32° the Trade Winds are blowing and bring rain to the south-eastern part of the U.S.A., the West Indies, and Central America. They are robbed of their moisture in crossing high land, and so in winter the land beyond the Rocky Mountains is dry. But in the summer the sun makes the plateau of Mexico very hot and a local monsoon blows from the Pacific Ocean. On the west coast, farther north, there is a small but important region where the Westerly Winds blow in winter, but, owing to the swing of the wind systems, not in summer. This region, which centres around San Francisco, has thus a Mediterranean Climate.

Rainfall. Remember what has been said about the winds and the rainfall is easy to understand. The northern part of the west coast and the Pacific slopes of the Rockies get a good rainfall all the year round from the South-Westerlies. Many of the deep valleys between the ranges of the Western Mountain System are sheltered from the rainy winds and remain very dry. The heavy rainfall is due to the warm winds being forced to rise over the high mountains; and it is heaviest in winter, when the mountains are coldest and the depressions are most intense and most frequent. When the winds reach the Central Plains they are dry, and as they are descending, and so getting warmer, they do not drop any moisture. The Plains thus get most of their rainfall in summer, when they are periodically invaded by masses of warm moist air from the Gulf of Mexico. These meet cold air from over the north of Canada and the warm moist air is forced to rise. In so doing it cools and rain results, often falling in violent thunderstorms. The Mediterranean Region, in California on the west coast, has its rain, of course, only in the winter. The south-eastern States, West Indies, and the east coast of Central America get a good rainfall from the Trade Winds, but the western coasts of Mexico and Central America get most of their rainfall from the local monsoon in summer.

NATURAL VEGETATION

The vegetation regions of North America broadly follow the climatic regions.

(a) *Tundra* stretches as a belt across the north from Alaska to Labrador.

(b) *The Coniferous Forest Belt* lies to the south of the Tundra and also stretches right across the continent. Coniferous Forest also occupies most of the Western Mountains in the north, and farther south wherever the rainfall is sufficient.

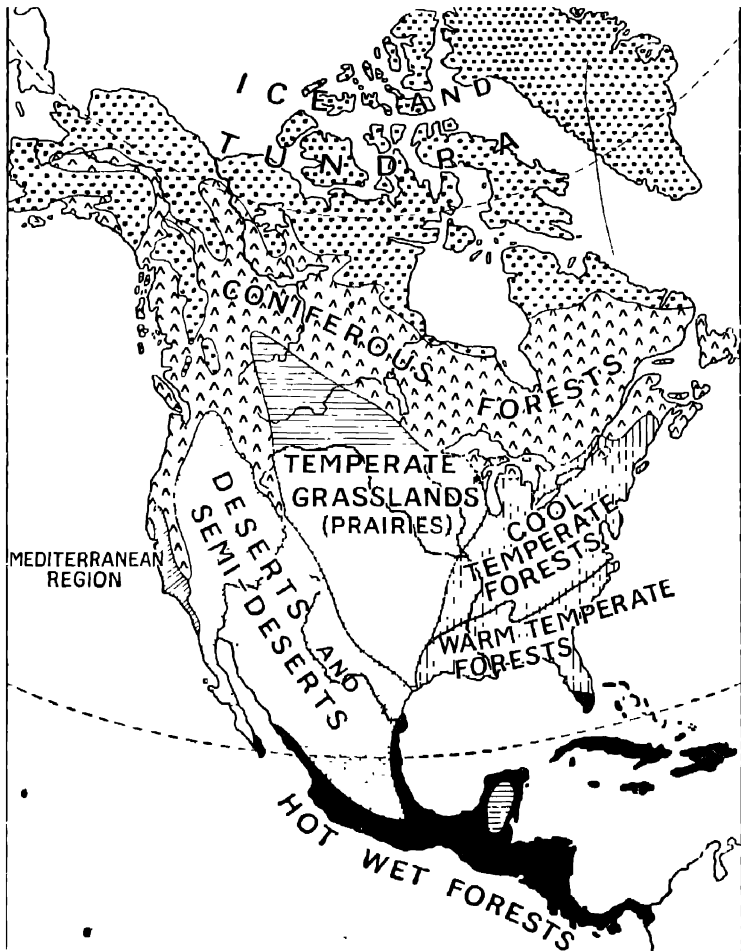


FIG. N.A.7.—The vegetation of North America

The higher parts of the Appalachian Mountains are also covered with Coniferous Forests.

(c) *Cool Temperate Deciduous Forest* occurs down the west coast and in the north-eastern United States. In both cases however, the forests are different from those of Europe, because mixed with the deciduous trees are many evergreen trees. In the west are the giant Sequoia and Douglas Firs; in the east are larches and spruces. On the map, Fig. N.A.7, the forests with Douglas Firs have not been separated from the more northern coniferous forests.

(d) *Mid-Latitude Grasslands, or Prairies*, occupy a great triangle in the centre of the continent. They gradually get drier towards the west and can be separated into the Tall Grass Prairies and Short Grass Prairies. Most of the prairies have now been ploughed up.

(e) *Mediterranean Vegetation* occupies a small area on the Pacific coast.

(f) *Deserts* occupy the dry plateaus of the Rocky Mountains in the United States and Mexico. The plateaus are high above the sea-level, and so they are cold in winter, but get very hot in summer.

(g) *Warm Temperate Forests*, with the famous yellow pine, occupy the south-eastern part of the United States.

(h) *Hot Wet Evergreen Forests* occupy the wetter parts of the tropical regions of Central America and the West Indies.

POPULATION

The native inhabitants are the so-called "Redskins," or American Indians. They were mostly hunters, and roamed over the great grasslands living mainly on the flesh of wild animals. In Mexico and Central America some of the American Indians, especially the group known as the Aztecs, were much more highly civilised and built themselves fine cities. The existence of the northern part of North America was probably known long ago to the Norsemen, but when we talk about the discovery of America by Europeans, we refer to the discovery of the West Indies in 1492 by Columbus. Columbus

was seeking a new route from Europe to India, and thought the new land he had found was really part of India. After the voyage of Columbus, many adventurous travellers sailed to explore the new lands but it was South America rather than North America which attracted them because of the stores of gold. After some years Europeans went to settle along the east coast of North America. Frenchmen settled in the north, and so we find French is still the language of Quebec; Englishmen settled farther south, and from these settlers has arisen the

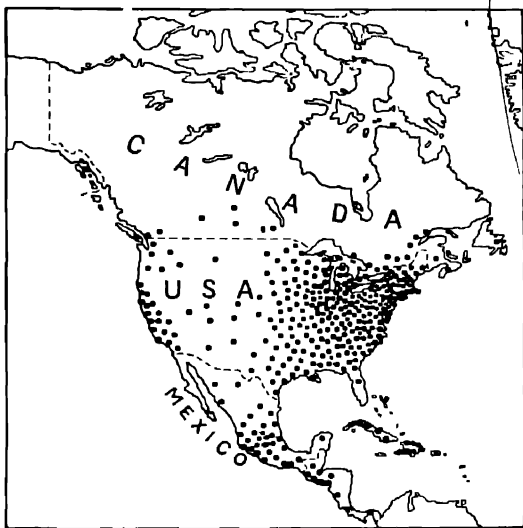


FIG. N.A.8.—The population of North America.

Each dot represents 500,000 (half a million) people. This map is on the same scale as the population maps of the other continents.

greatest republic in the world—the United States of America. The United States separated from England in 1776 (Declaration of Independence).

POLITICAL DIVISIONS

Stretching right across the north of the continent is the Dominion of Canada, an important part of the British Commonwealth. It is divided into ten provinces and two territories.

The island of Newfoundland, controlling also Labrador, joined the Confederation in 1949. Canada is considerably larger than Australia or the United States.

The United States of America stretches right across the continent to the south of Canada. Alaska, in the cold north-west, belongs to the United States. The United States of America has also the principal right over the land on either side of the Panama Canal, and also owns Puerto Rico. Mexico is a large republic south of the United States. Central America is divided between six small republics and the British Colony of British Honduras. The largest West Indian island of Cuba is a republic. The large island of Haiti or Hispaniola is divided between two negro republics; the island of Jamaica and most of the smaller islands of the West Indies belong to the British Commonwealth.

CANADA

Two hundred years ago Canada was occupied by small numbers of American Indians, many of whom roamed the prairies hunting the buffalo or trapped for their furs the numerous animals of the forests. In the east were French and British settlements, whilst the Hudson's Bay Company had small trading posts round Hudson Bay. In a country nearly as large as the whole of Europe, there were probably fewer people than there are in the city of Manchester. Canada has grown rapidly in the last fifty years, and there are now over 17,000,000 people in the country. Of these only 100,000 are American Indians. The remainder are white people—descendants of British, French, and other settlers.

Canada may be divided into five natural regions:

- (a) The Western Mountains and the Pacific Coast. •
- (b) The Canadian Shield.
- (c) The Prairies.
- (d) The St. Lawrence Lowlands.
- (e) The Maritime Provinces. •

The Western Mountains and the Pacific Coast lie mainly in

the province of British Columbia. The northern part constitutes the Yukon Territory. The whole region is mountainous and very different in all respects from the remainder of Canada. The coast is like that of Norway—mountainous islands and peninsulas, separated by deep fiords and straits. The largest island is Vancouver Island, about half the size of Scotland. Near the coast of the mainland are the lofty Coast Mountains, behind them a series of dry plateaus, then the Selkirk Range,

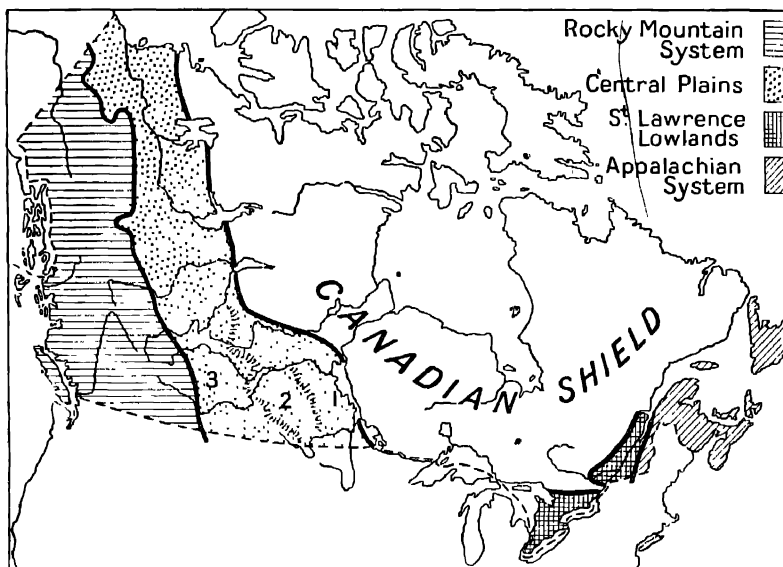


FIG. N.A.9.—The natural regions of Canada.

The three prairie steps are numbered 1, 2, and 3.

and finally the Rocky Mountains themselves. In the north is the Yukon Plateau, drained by the Yukon River, and situated partly in Canada, partly in Alaska. The whole region is under the influence of the South-Westerly Winds; thus the exposed mountain chains are very wet, whilst sheltered valleys and plateaus in rain-shadow areas may be very dry. The coast is kept mild by on-shore winds from over the North Pacific Drift. In many respects the climate of the coast is similar to that of the British Isles, in the same latitude. Except in the high

parts, the hills and mountains are forest-covered. The forests are of fine coniferous trees such as the Douglas fir, red cedar, and white pine. Lumbering is an important industry. Many parts of British Columbia are rich in minerals, especially ores, of copper, silver, lead, zinc, gold and others. In Yukon were the celebrated Klondike Goldfields to which there was a great "gold rush" in 1898 but little gold is now produced.

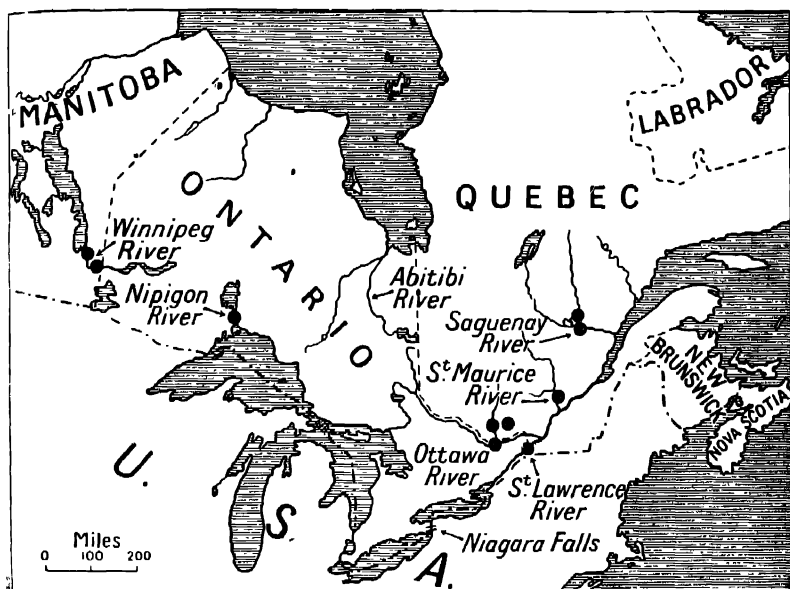


FIG. N.A.10.—Map of Eastern Canada, showing the principal hydro-electric power generating stations.

The fisheries of the Pacific coast are world-famous. The salmon lives part of its life in the sea and part in rivers: every year enormous numbers move up the Fraser and other rivers, and are netted especially at the river-mouths. The salmon are canned and exported all over the world. True sea fishing is also carried on, especially for tuna and cod: water power is abundant and the great Kitimat scheme brings water by tunnel through a mountain to generate power especially for a huge aluminium smelting works.

The warm, sheltered valleys of the southern part of British Columbia are famous for their fruit orchards—apples, pears, cherries, and plums, with peaches and grapes in the warmest parts. The Rocky Mountains themselves form a great barrier between British Columbia and eastern Canada. At much expense three railways have been built across them. One, the famous Canadian Pacific Railway (main line), starts from Vancouver, goes by the Fraser River Valley and then along its tributary the Thompson, and passes through the Kicking Horse Pass. The second, the Canadian National Railway, was built later. It has two branches, one from Vancouver following the same route as the C.P.R. for part of the way, the other from Prince Rupert. The two lines join and pass through the main chain by the Yellowhead Pass. The third railway across the Rockies is the branch line of the C.P.R. from Lethbridge on the Prairies to Vancouver, using the Crow's Nest Pass. *Vancouver* (with New Westminster adjoining) is the principal city in British Columbia. Notice carefully its position (Fig. N.A.11). *Victoria*, on Vancouver Island, guards the entrance both to Vancouver and also to the United States port of Seattle. Vancouver is an industrial centre having a large trade with Japan, China, and many other parts of the world. *Prince Rupert*, farther north, is a terminus of the C.N.R., and a centre of the fishing industry. Banff in Alberta is a summer resort in the heart of the Rockies; near by are several coalfields in the foothills of the Rockies.

The Canadian Shield. To the north of Canada are numerous islands, uninhabited except for a few Eskimo, and covered with ice and snow during the long winter. The sun shines day and night in the summer, and vegetation is then luxuriant. The coastal Eskimo lives largely on seal-meat or fish caught largely in summer but sometimes in winter through holes in the ice. The northern part of the mainland is occupied by tundra with much grass, where there are large herds of caribou. Some tribes of Eskimo hunt these animals. The caribou when domesticated is known as reindeer. As one moves southwards trees gradually appear, and one enters the Coniferous Forest Belt. The forest stretches in a broad belt

across Canada from Alaska to Labrador, and as far southwards as the shores of the Great Lakes. In the early days of the development of Canada the Hudson's Bay Company traded largely in furs obtained from the animals of these northern forests. Wild animals are getting scarcer; and furs are being produced more and more from fur farms. Production of minerals, lumber and pulp wood are the main industries over

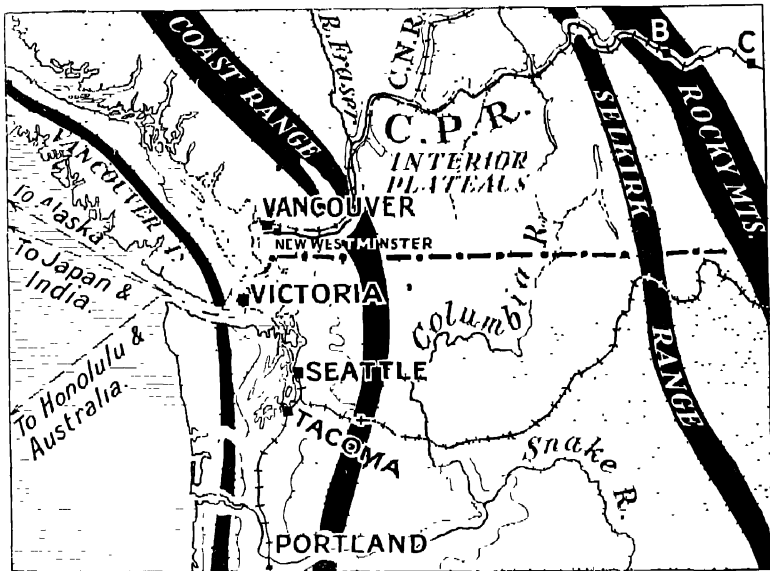


FIG. N.A.11.—The position of Vancouver and Seattle.

Notice that Victoria, on Vancouver Island, guards the entry to both ports
 B—Banff C—Calgary

Due west of Vancouver on Vancouver Island is the rapidly growing town of Nanaimo.

most of this region especially near the Great Lakes and the St. Lawrence. The trees are cut when the snow is on the ground; the logs are dragged over the slippery snow to be floated down the rivers when the ice melts. The saw-mills are usually found where water power is available, and many immense power plants have been constructed (see Fig. N.A.10). There are still large undeveloped resources of water power in all this region. Underlying nearly the whole of the Forests is

THE DEVELOPMENT OF THE PRAIRIES

1. First, railways are built; then people come and settle on the land.

RAILWAY MILEAGE

1900 - 3,716 MILES



1910 - 7,641 MILES



1924 - 15,820 MILES



1937 - 20,500 MILES



1901 - 419,512



1911 - 1,328,121



1921 - 1,956,082

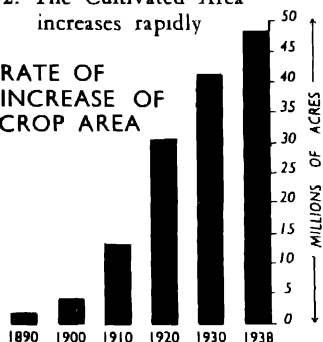


1931 - 2,353,529



2. The Cultivated Area increases rapidly

RATE OF INCREASE OF CROP AREA



WINNIPEG

1901 - 42,340
1911 - 136,035
1921 - 179,085
1931 - 218,785
1941 - 221,960

3. Towns spring up.

EDMONTON

1901 - 4,176
1911 - 31,064
1921 - 58,821
1931 - 79,197
1941 - 93,817

CALGARY

1901 - 4,392
1911 - 43,704
1921 - 63,305
1931 - 83,761
1941 - 88,504

REGINA

1901 - 2,249
1911 - 30,213
1921 - 34,432
1931 - 58,209
1941 - 58,245

SASKATOON

1901 - 113
1911 - 12,004
1921 - 25,739
1931 - 43,291
1941 - 43,027

4. Production is enormous

FIELD AND DAIRY PRODUCTS

1938



HONEY
8,200,000 lbs



CHEESE
1,750,000 lbs

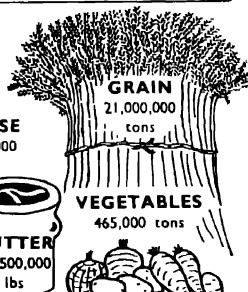


FIG. N.A.12.—Diagram illustrating the development of the prairies of Canada

In 1951 the population of the Prairie Provinces had increased to 2,547 770

the mass of old hard rocks known as the Canadian or Laurentian Shield. Many parts have not yet been properly explored for minerals, and the most important mineral region at present known is north of the Great Lakes, particularly around Sudbury. *Sudbury* now produces four-fifths of the world's supply of nickel and large quantities of copper as well. Large iron ore deposits also occur along the northern shores of Lake Superior, in north-eastern Quebec, and in Labrador. Around *Cobalt* are large deposits of silver ore, whilst more cobalt ore is

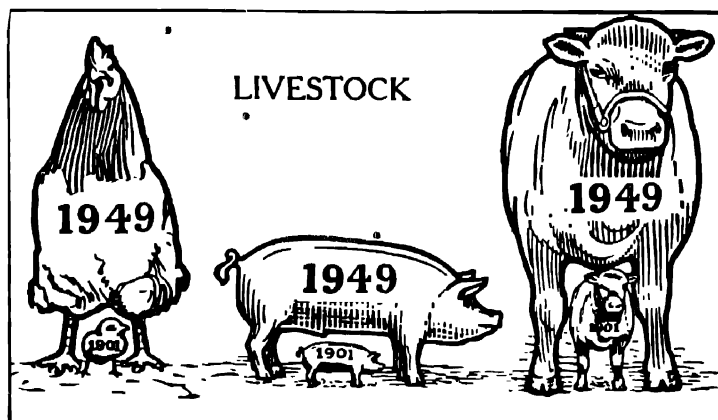


FIG. N.A.13.—Livestock on the prairies.

	Horses.	Cattle.	Sheep.	Swine.	Poultry.
1901 .	340,000	942,000	190,000	200,000	1,717,000
1911 .	1,195,000	1,809,000	285,000	712,000	8,432,000
1923 .	2,329,000	3,748,000	470,000	1,678,000	19,021,000
1926 .	2,390,000	3,528,000	514,000	1,715,000	19,358,000
1931 .	2,063,000	3,300,000	1,282,000	2,391,000	26,000,000
1944 .	1,713,000	4,600,000	1,872,000	4,500,000	41,000,000
1955 .	464,000	4,200,000	676,000	2,743,000	24,000,000

available than the world needs. Gold is also found at Porcupine and in the Kirkland Lake belt, and the shield as a whole now produces four-fifths of the gold of Canada.

The Coniferous Forest Belt is mostly too cold for agriculture except along its southern borders, and the soil is usually poor. The region is likely to advance in mining and lumbering rather

than in agriculture. But along the line of the C.N.R. from Quebec to Winnipeg there is a belt of clay land which affords good pasture and can grow a variety of hardy crops.

The **Prairies** of Canada form part of the great triangle of treeless grassland in the centre of the North American continent. The land gradually rises from the level of Lake Winnipeg on the east to the foot of the main Rockies on the west.



[Photo. Canadian Pacific Railway]

FIG. N.A.14.—A typical prairie town in Canada in the early days.

Such towns commence by being just a small collection of wooden buildings. All round are the vast rolling grasslands or wheatlands (Calgary about 1900)

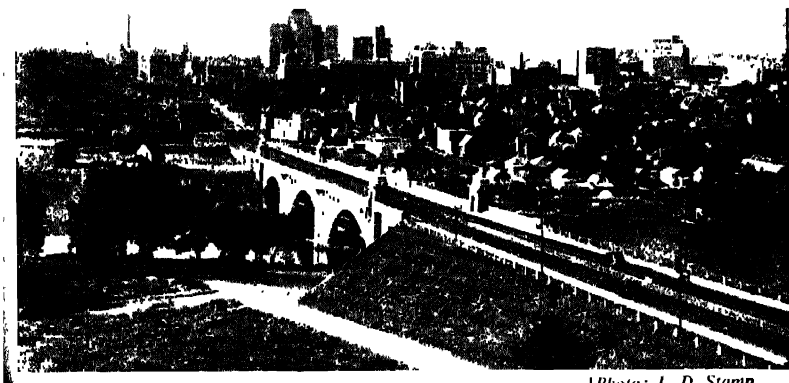
The rainfall, too, decreases from east to west, and in the south-west it is too dry for agriculture without irrigation. The prairies are often divided into three levels or "steps" (marked 1, 2, and 3 on Fig. N.A.9):

(a) The low prairies, west of Lake Winnipeg and around the Red River. This area was once the bed of a great lake, and has a damp, rich soil and a moderate rainfall, and forms

one of the richest wheatlands in the world. Mixed farming is now becoming very important.

(b) The middle prairies or second prairie step, farther west, are somewhat drier but form rich wheatlands.

(c) The high prairies are drier, and wheat can only be grown in the best parts. Irrigation from streams from the Rocky Mountains (such as the Bow River) has been carried out, and



[Photo: L. D. Stamp

FIG. N.A.15.—The same town—Calgary—taken from the same spot in 1948.

the area is being developed. Except where irrigated this is mainly a cattle-ranching area, but the grass is rather poor for cattle. Huge coalfields underlie much of the western prairies and extend into the foothills of the Rockies. There are now many small mines. Oil-drillers have been searching for oil and there are now important fields at Leduc and Redwater near Edmonton and in the Turner Valley, Alberta.

Over the whole of the prairies the winters are cold and the summers are warm or hot. Wheat can be grown (except in the

south-west, where it is too dry) wherever the temperature is 57° or more for at least three months of the year. In 1928, the prairies of Canada, with less than 2,200,000 people, sowed 23,000,000 acres of wheat and produced 510,000,000 bushels of grain; in the same year Australia, with 6,400,000 people,

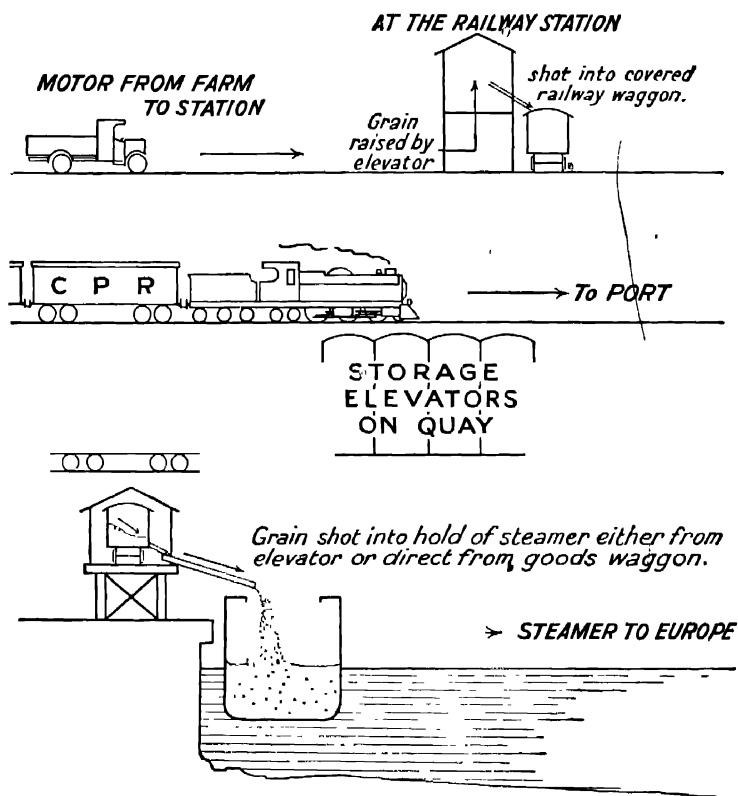


FIG. N.A.16.—Diagram to illustrate bulk-handling of grain.

sowed 12,500,000 acres for a production of 150,000,000 bushels: 1928 was a year of remarkable yield. In both 1952 and 1953 phenomenal harvests yielded over 600,000,000 bushels. In this area, too, nearly as much oats is produced as wheat, as well as enormous quantities of barley and, on the poorer soil, rye. The oats and barley are often grown towards

the north, in regions a little too cold for wheat. Another crop is flax, whilst large quantities of fodder are grown for feeding the cattle. Large numbers of eggs are produced, as well as butter. There are large numbers, too, of pigs. The prairies of Canada have been developed with great rapidity. In 1900 the area under crops was only one-tenth of what it is now; the



[Photo. Canadian National Railways.

FIG. N.A.17.—Handling wheat in bulk—a grain elevator in Canada.

The wheat is collected from the prairies, stored in the big grain elevators, such as those shown in the picture. The wheat is pouring through the small black pipe and loading the wagon shown

population less than one-fifth; there was not a single town with 50,000 people. This marvellous development was made possible by the railways—roads played a part later. The rivers of the prairies flow either towards the cold north or into Lake Winnipeg, and so through Nelson River into Hudson Bay. The entrance to Hudson Bay is blocked by ice for about nine

months of the year. So nearly all the grain has to be sent to the great ports by railway. The grain is taken to the railway by "trucks" or lorries, and loaded into grain elevators. The grain is then shot into large railway trucks (boxcars), and when these reach the seaports the grain can either be stored in the elevators or discharged straight into the steamer. Grain can be treated almost as a liquid—it can be poured through pipes and also sucked up through pipes. There is no need to

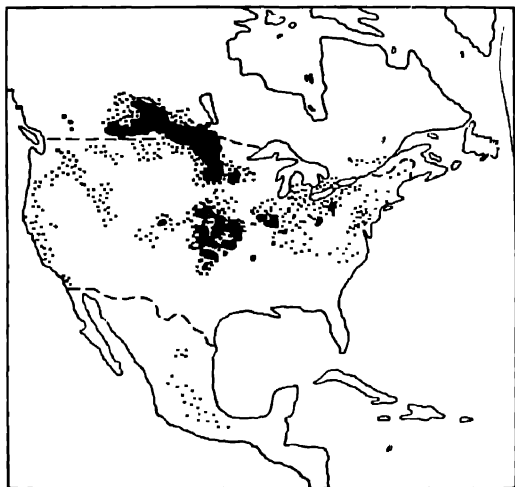


FIG. N.A.18.—The wheatlands of America.

Notice that most of the wheat comes from the prairies of Canada and from prairie lands of the United States.

Which are the spring wheat lands, which the winter or fall wheat?

use bags at all. The towns of the prairies are grain-collecting centres: *Calgary* (the ranching centre), *Edmonton*, *Regina*, and *Saskatoon*. They have all grown into towns since 1900. The largest city of all, *Winnipeg*, is nearly as large as Nottingham (260,000); seventy years ago it had less than 1,000 people. In addition to their importance as collecting centres, the prairie towns are rapidly becoming industrial centres. In the northern part of the prairies (in Northern Alberta and the neighbouring parts of British Columbia) is the Peace River country. This

has been settled even more recently and has great agricultural possibilities. In the north of the Prairie Provinces is part of the Canadian Shield with valuable minerals, and the rich oil discoveries, especially near Edmonton, have made great changes. Pipe lines take the oil to Vancouver and to the Great Lakes.

The St. Lawrence Lowlands. The lowlands on either side of the St. Lawrence River, as well as the land north of Lakes Erie and Ontario, form another rich agricultural area. Unlike the prairies, these areas have been developed by white people

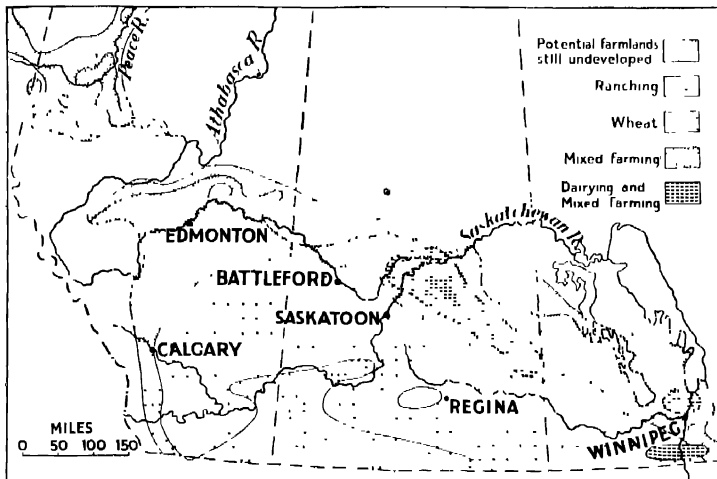


FIG. N.A.19.—The types of farming in the prairies.

for more than 200 years. This region forms part of the great provinces of Ontario and Quebec. Nearly three-fourths of the people of Canada still live in this region and in the Maritime Provinces. The natural vegetation is woodland or forest consisting of a mixture of coniferous and deciduous trees.

The farming in this region is more like it is in England, and mixed farming is the rule. Oats, wheat, barley, and rye are all grown, as well as large quantities of potatoes. More important still is dairy farming. More than half the cows of Canada are in this region and the Maritime Provinces, as well as many of the sheep, pigs, and poultry.

Lake Ontario, the Welland Ship Canal (thus avoiding Niagara Falls), Lakes Erie and Huron, through the "Soo" Canals to Lake Superior, thus reaching Fort William or Port Arthur, two ports situated nearly 2,000 miles from the open Atlantic but not more than 400 miles from Winnipeg. The twin ports of Fort William and Port Arthur handle more grain than any other port in the world. The St. Lawrence Seaway, opened in 1959, now enables ocean-going vessels to reach the Great Lakes.

The Maritime Provinces. The three small provinces of Eastern Canada—Nova Scotia, Prince Edward Island and New Brunswick—are usually known as the Maritime Pro-

RAW MATERIALS AND FOOD

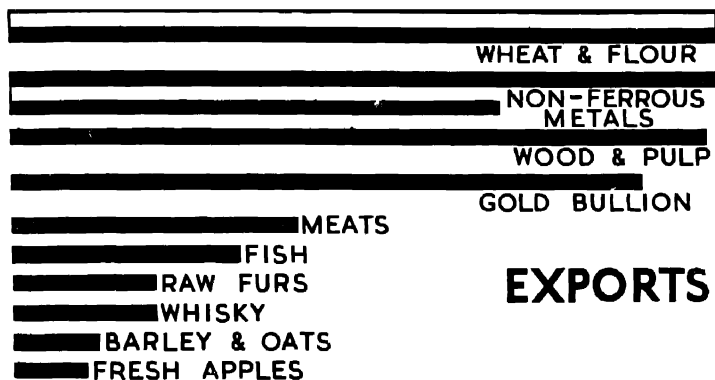


FIG. N.A.21. —The exports of Canada.

vinces. They form a distinct natural region which is a continuation of that part of the Appalachian mountain system lying in the New England states. The areas of densest population are the lowlands with a rich red soil—especially the Annapolis and Cornwallis Valleys of Nova Scotia, Prince Edward Island, and the northern part of New Brunswick—famed for their apple orchards and agricultural lands. In Nova Scotia is the important Sydney Coalfield.

Trade of Canada. Although Canada now ranks amongst the first six manufacturing countries of the world, she is still largely an agricultural and mining country. The leading

exports are thus raw materials and foodstuffs and manufactured goods still bulk largely among her imports. Look at Figs. N.A.21 and N.A.22 and compare them carefully. The value of the trade of Canada is very great. Notice the largest ports. In the west there is Vancouver; in the east Montreal, Saint John, Halifax, and Quebec. An attempt has been made to develop Churchill on Hudson Bay; it is the nearest port to the wheatlands, but the route is only open for a few months of the year.

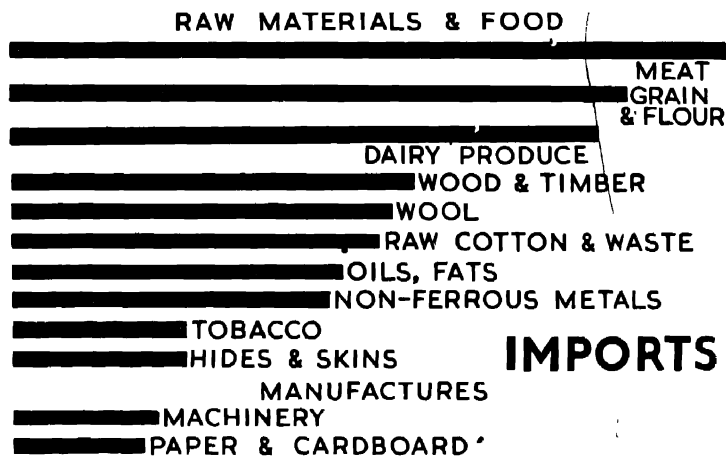


FIG. N.A.22.—The imports of the United Kingdom.

Notice how many of the necessities required by the United Kingdom can be supplied by Canada.

By far the most important customers for the exports are Great Britain and the United States; the imports come especially from the same two countries.

NEWFOUNDLAND

Until recently the island of Newfoundland formed a separate Dominion of the British Empire, and also controlled a large area of the coast-lands of Labrador. In 1949 the people decided to join the Dominion of Canada. Geographically

the island is a continuation of the Appalachian mountain system. The climate is too cool in summer for good crops of cereals, so that hay, potatoes, and turnips are the chief crops. Much of the land is forested and there are large saw-mills, paper and pulp mills. The famous iron ore deposits of Bell Isle supply the furnaces of Sydney, Nova Scotia. Especially famous are the fisheries of the Grand Bank off Newfoundland. St. John's is the capital of Newfoundland.

QUESTIONS AND EXERCISES

1. Describe a journey across Canada by the C.P.R.
2. Give an account of the ports of Canada and their trade.
3. Compare and contrast British Columbia and Scandinavia.
4. Write an account of the lumbering industry of Canada.
5. What mining industries exist in Canada and where?
6. Describe a year in the life of a farmer on the prairies.
7. In what ways do you think Canada will progress in the future?
8. Describe and account for the position of the following cities and towns: Winnipeg, Montreal, Calgary, Halifax, and Churchill.

THE UNITED STATES OF AMERICA

The great republic known as the United States of America was founded by the "Declaration of Independence" in 1776, but at that time only the eastern parts had been settled and developed. It is roughly the same size as Canada, but is situated almost entirely in the Temperate Zone, and has 179,000,000 people, against Canada's 17,000,000. It is thus larger than Australia, and contains eighteen times the population of that continent. About 350,000 people are American Indians, descendants of the original natives of the continent; 18,000,000 are Negroes, descendants of slaves brought originally from Africa, whilst the remainder are nearly all white people who have left the crowded countries of Europe during the last 300 years and settled in the new land. The United States has vast natural resources of coal, oil, metals, and land, and has become the richest nation in the world.

This huge country twenty-five times the size of the British Isles may be divided into a number of natural regions:

- (a) New England.
- (b) The Appalachians and the Mid-Atlantic Coastlands.
- (c) The South.
- (d) The Interior Lowlands.

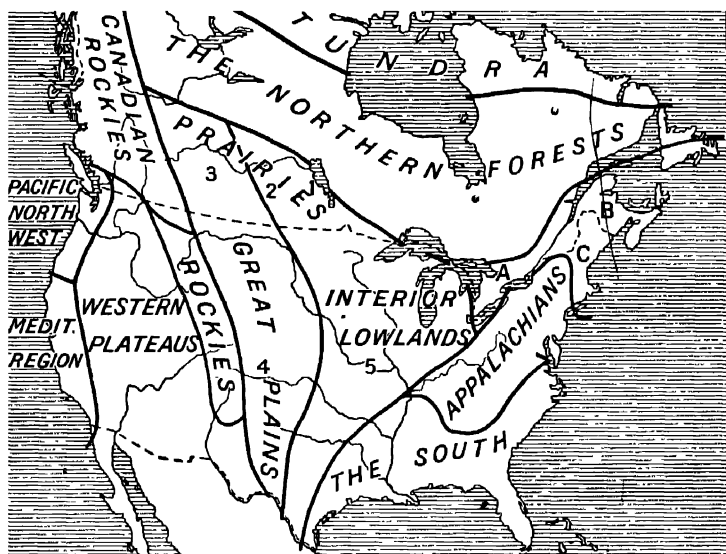


FIG. N.A.23.—The natural regions of the United States and part of Canada.

The Prairies of Canada: 1 The Low Prairies; 2 The Middle Prairies; 3 The High Prairies. **The Prairies of the United States:** 4 The High Prairies, including the Bad Lands, 5 The Mississippi Basin. **North-Eastern America:** A, The St. Lawrence Valley, B, The Maritime Provinces of Canada; C, The New England States.

- (e) The Great Plains.
- (f) The Rocky Mountains.
- (g) The Western Plateaus.
- (h) The Pacific North-West.
- (i) The Mediterranean Region.

New England. The six New England states of Maine, Vermont, New Hampshire, Massachusetts, Rhode Island and Connecticut occupy the extreme north-east of the United

States—adjoining the eastern provinces of Canada. ~~This~~ was the part of the United States where the early colonists from England settled. The first main group is referred to as the “Pilgrim Fathers” and they landed from the “Mayflower” in 1620 and one of the earliest towns they founded was Boston.

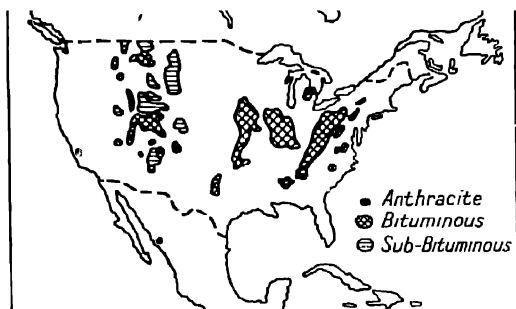


FIG. N.A.24.—The coalfields of the United States.

The chief worked fields are Appalachian, Southern Appalachian; Illinois; Kansas Oklahoma and Pennsylvania Anthracite

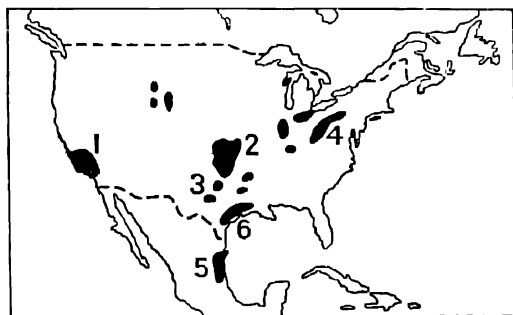


FIG. N.A.25.—The oilfields of the United States.

1 = The Californian Fields; 2 = Mid-Continent Fields; 3 = The Texas Fields; 4 = Appalachian Fields; 5 = Mexican or Tampico Fields; 6 = Gulf Coast

They were mostly farmers and sought refuge in the new land in order to follow their Puritan religion in peace. Many of their new settlements they named after the towns or villages in England, from which they came (Boston, Worcester, Manchester, etc.). The winters in New England are more severe than those in old England and the farmers found the work of

clearing the forests and working the stony soils very hard. Settlement was almost entirely in the valleys and on the coastal lowlands. This is still a region of mixed farming—with dairying and apple-growing—but from about 1840 onward many farmers left for the opening up of the rich prairies and now there is much deserted farm land because it is poorer than the lands of the Middle West. The colonists also brought various trades with them, and gradually manufacturing industries developed. Water and water-power were available but no coal nor oil, no iron ore nor other important metals, no cotton and only a little wool. With few natural advantages New England became a great manufacturing area. Coal is brought from Nova Scotia and Pennsylvania and the great port of Boston is nearer to Europe than is New York. Half the cotton goods of the United States are made in New England—especially at *Fall River, Manchester, Providence*; *Boston* is the great wool market as well as the centre of boot and shoe manufacture. In the Connecticut Valley are towns famous for sewing machines, typewriters, watches, cutlery, fine machinery and other metal goods requiring little raw material. Large areas of the uplands, especially the northern State of Maine, are still forested and the forests provide wood-pulp and, with their many lakes, are favourite holiday resorts for those who like camping, fishing, and shooting. Commercial fishing is important along the coasts.

The Appalachians consist of mountains, hills and plateaus, stretching south-westwards from Lake Ontario and the Hudson Valley roughly to the neighbourhood of Birmingham in Alabama. On the eastern or Atlantic side there is usually a broad plateau—the Piedmont Plateau—built up of ancient rocks. Where the rivers descend from these plateaus to the coastal plain there are rapids and waterfalls. In olden days ships coming up the rivers from the sea could not get beyond the falls and so towns grew up where goods were transferred from water to land transport. These “Fall Line” towns turned the water power to good use and became manufacturing towns also. Inland the plateau is bounded by a long ridge of mountains (Blue Ridge mountains), then come series of long narrow



valleys and ridges and finally, on the west, the broad Alleghany plateau under much of which lies the largest coalfield in the world, the Appalachian Coalfield.

Towards the north, the Appalachians are close to the Atlantic Ocean and there is scarcely any coastal plain. The Fall Line towns are also great ocean ports and include some of

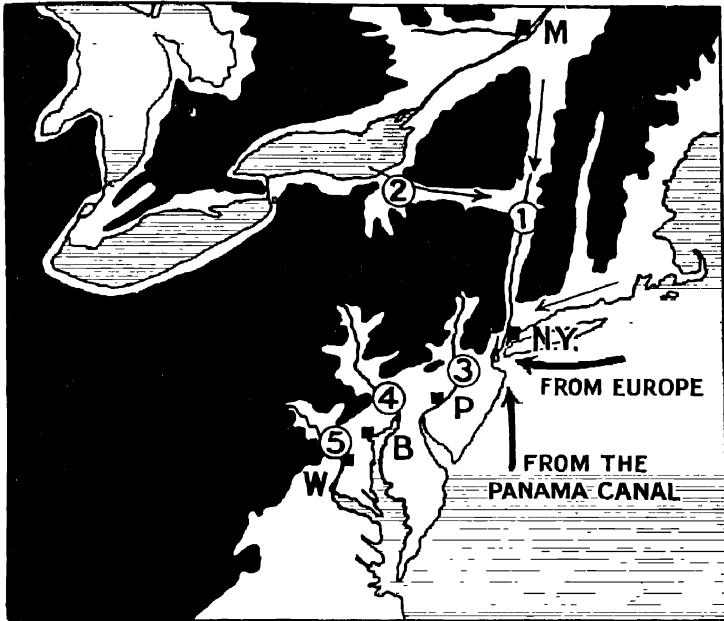


FIG. N.A.26.—The position of New York, at the entrance to the Hudson-Mohawk Gap. All land over 600 feet, black.

The Hudson River, 2 = The Mohawk Gap, 3 = The Delaware Gap with Philadelphia (P); 4 = The Susquehanna Gap with Baltimore (B), 5 = The Potomac Gap with Washington (W). Notice that the Hudson-Mohawk is the only complete gap affording access to the Great Lakes and also directly northwards to Montreal (M). No less than two or four main railways run down the narrow Hudson Valley to New York.

the greatest cities in America—New York, Philadelphia, and Baltimore. The Dutch settled on the small island of Manhattan at the mouth of the Hudson and founded what is now New York—a rival of London for the claim to be the largest city in the world; Quaker settlers founded Philadelphia;

Catholic settlers Baltimore in Maryland (named after Queen Mary), English noblemen favoured Virginia (named after Queen Elizabeth) and the lands farther south. Soon after the United States became independent of England in 1776, President George Washington chose the site of the capital and Washington was built—a beautiful city beautifully situated on the Potomac.

For long the early settlers confined themselves to the coast, because of the formidable mountain barrier but later, especially

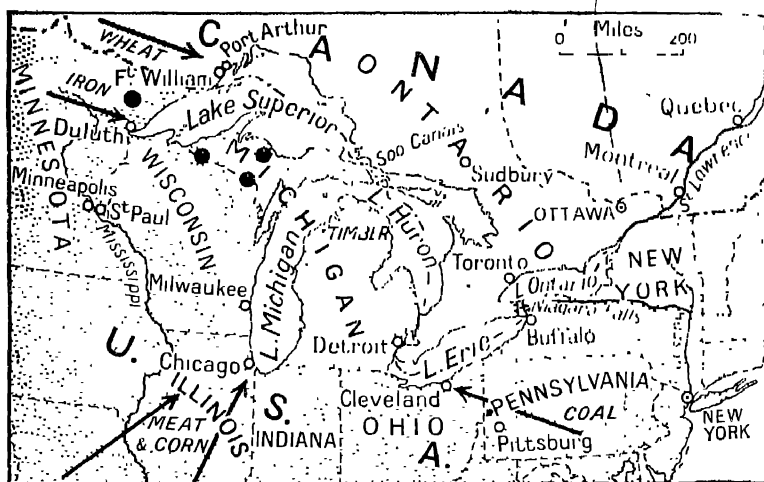


FIG. N.A.27.—The Great Lakes.

This wonderful series of waterways is frozen over from December until April or May. Notice the scale and measure the distance from Duluth to New York by water. The large round dots denote deposits of iron ore.

when the great coalfield was discovered, the natural routeways into the interior became very important (Fig. N.A.26). A great iron and steel industry grew up on the coalfield especially at *Pittsburgh* in Pennsylvania, but soon local iron ores were insufficient. Most of the ore is now brought from the huge mines and quarries near the western end of Lake Superior. It is brought by water to the shores of Lake Erie and there meets coal sent down from the mines so that other great steel centres are Cleveland, Akron, and Buffalo (Fig. N.A.27).

No American port is quite so favourably situated as New York. The largest liners can use its huge natural harbours and berth along the wharfs of Manhattan island. The Hudson valley provides a route almost at sea-level, at first northwards towards Canada and then by the Mohawk valley to the Great Lakes. This natural route is used by railways and the New

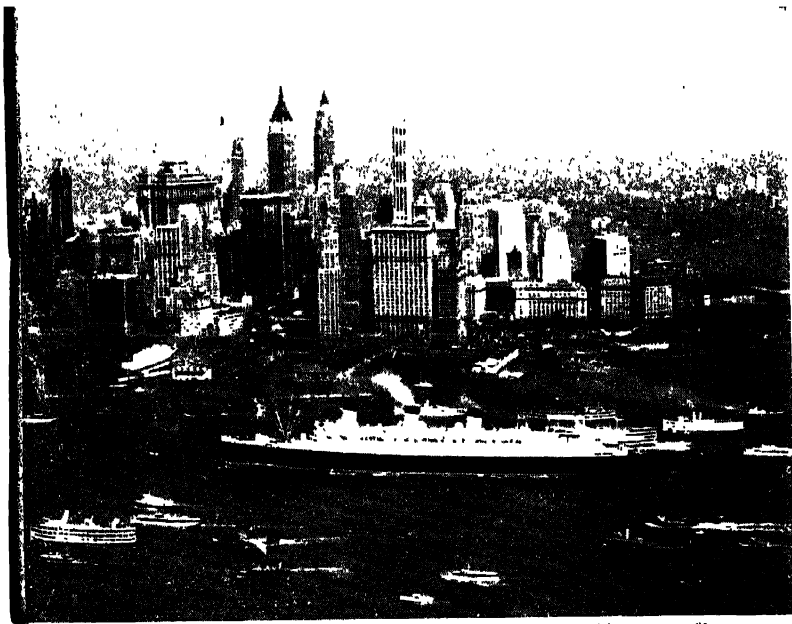


Photo · Aerofilms

FIG. N.A.28.—An aerial view of the southern end of New York City.

Notice that New York is hemmed in by water on both sides and cannot expand laterally. Hence the very tall "skyscrapers." Compare this with London. This picture shows the "Queen Mary" making her way up the Hudson after crossing the Atlantic Ocean. The view is taken looking eastwards.

York State Barge (Erie) Canal (opened 1825, later enlarged and realigned). New York has many manufactures: its harbour is shared by Newark and Jersey City. Silk goods and clothes are amongst the industries.

The South. What Americans usually call simply "the South" comprises the lowlands round the Gulf of Mexico and the w.(E.)—20*

Atlantic Coastal Plain south of Washington. It includes the great Cotton Belt, where the majority of American negroes live. This region enjoys a good rainfall; the coldest month has an average temperature well above freezing, whilst the summer months are as warm as they are in the tropics. All the region has at least 200 days free from frost. Most of the rain comes in the warm part of the year so the climate is a little like that of monsoon lands. The two chief crops are cotton and maize. More than half the world's cotton (especially the well known

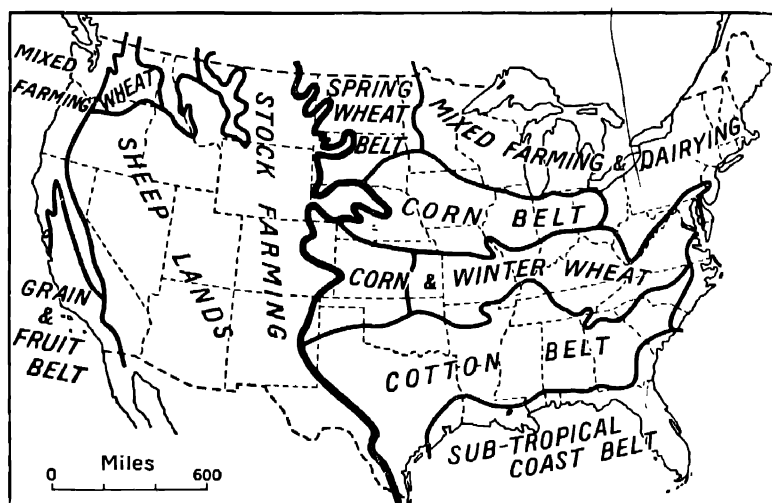


FIG. N.A.29.—The Agricultural Regions of the United States.

American upland cotton) is grown in this one region. Formerly the cotton was sent down the lower Mississippi and its tributaries, such as the Red River, for export from *New Orleans*, or was exported from the Atlantic coast ports of *Savannah* and *Charleston*. Now a great network of railways handles most of the cotton, and the Gulf coast ports of *Houston* and *Galveston* export huge quantities. Another important crop in the south, especially in *Virginia* and the *Carolinas*, is tobacco.

Near the shores of the Gulf of Mexico, especially in or near

the Mississippi delta, the climate is specially mild and cotton gives place to rice and sugar-cane. The peninsula of Florida does not grow cotton, but is famed for its oranges and grape-fruit; the poorer soils have large stretches of pine-forest. On the coast are such seaside resorts, famed for their mild winters, as *Palm Beach* and *Miami*. This is the Sub-Tropical Coast Belt of Fig. N.A.29.

The Interior Lowlands. The great lowland in the heart of the United States, lying in the basin of the Mississippi and its tributary the Ohio, was once covered with rich grassland (Tall Grass Prairies) passing eastwards into forests. Within the last hundred years it has nearly all been changed into rich farm land—the finest stretch of farm land in the world. In the north is the continuation of the wheatlands of Canada and huge quantities of spring wheat are sent to the flour-mills of *Minneapolis* and *St. Paul*.

Southwards, the summers are warmer and maize, called by Americans simply “corn,” takes the place of wheat. In this famous “Corn Belt” the corn is used for fattening cattle and pigs. More than half the pigs of the United States are found in the Corn Belt and cattle from the drier western lands are sent here for fattening. The animals go later to the slaughter houses at *Chicago*, *Kansas City* and other centres. This is the part of the United States often called the “Middle West.” South of the Corn Belt much winter wheat is grown as well as maize. Here the great centre is *St. Louis* near the junction of the Missouri and Mississippi rivers, whilst other great towns in the Belt are *Omaha*, *Indianapolis* and *Cincinnati*. But the greatest city of them all is *Chicago*—in 1834 a few log huts, now with over 4,000,000 people and among the ten largest cities in the world. It owes its growth to its central position—a focus of railway and water routes. Other large lakeside towns include *Milwaukee* and *Detroit*, the fourth largest city in the United States, where Ford cars and other motors are made. The growth of these manufacturing cities has been aided by the coalfields and oilfields underlying the central plains (Figs. N.A.24, N.A.25). Just around the western end of Lake Superior, the United States fortunately shares

a part of the ancient rocks of the Canadian shield. Over eighty-per cent. of the iron ore of the United States comes from these old rocks and is shipped from Duluth (Fig. 381). There are also rich copper ores.

In the south of the interior lowlands is a small plateau of old rocks, called the Ozark Plateau. It is rich in minerals—ore of lead and zinc (see Fig. N.A.2).

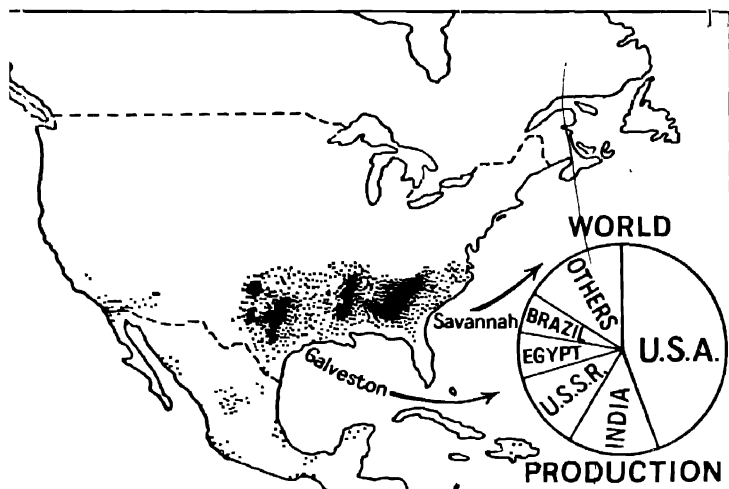


FIG. N.A.30.—The cotton lands of America and the world's production of raw cotton (excluding China).

Nearly half of the world's supply (excluding China) comes from the United States. The arrows show the routes by which the cotton is exported (from Galveston and Savannah) to England.

The Great Plains. From the foot of the Rocky Mountains, the land slopes gradually from a height of 3,000 to 5,000 feet to the Mississippi. The high western section was formerly covered with poor grass (Short Grass Prairies), and the rainfall is generally less than 20 inches a year. There are rivers flowing down from the Rockies but their valleys are rather deep and the water cannot be led on to the plateau for irrigation. Millions of cattle wander about the region and find sufficient grass on which to live, but they are sent to the Corn Belt for fattening before being killed. The greatest ranching State of

all is Texas. Much of Texas and the neighbouring State of Oklahoma and Kansas have changed greatly since the development of the oilfields. In the north, in the States of North and South Dakota, the driest lands with their deep sandy river valleys are often called the "Bad Lands." There is really only one large town actually in the midst of the Great Plains—it is *Denver*, near the foot of the Rockies, but on the south-eastern margins are Dallas and Fort Worth twin cities of Texas and, farther north, Kansas City.

The Rocky Mountains. Although the western third of the United States, with its great mountain ranges and its huge plateaus, is often said to be occupied by the "Rocky Mountain System" the Rocky Mountains proper lie between the Great Plains on the east and a series of plateaus on the west. They are less majestic than the Canadian Rockies—a tangled mass of forested ranges in the north, with some broad basins and valleys passing southwards into two parallel ranges, and almost dying out near Santa Fe before the Mexican border is reached. In the heart of the Rockies is a huge tract of beautiful country with geysers, hot springs, gorges, lakes, mountains and forests which has been made into a great playground nearly half the size of Wales and known as "Yellowstone National Park."

The Western Plateaus. Lying between the Rocky Mountains on the east and the Cascade Range and the Sierra Nevada on the west are series of lofty plateaus, separated by ranges of mountains. In the south the plateau belt is nearly 1,000 miles wide. The plateaus are cut off from the Pacific Ocean by the Sierra Nevada and Cascades, and from the Atlantic by the Rockies, with the result that they are very dry. Most of the land is desert or semi-desert where only a few sheep or cattle can find enough to eat. The mountain ranges have a heavier rainfall owing to their height and are forested. The plateaus are cold in winter but often extremely hot in summer.

The *Columbia Plateau* in the north is formed of huge sheets of lava which weathers to a fertile soil. The plateau is drained by the Columbia river which passes through a magnificent gap in the Cascade Range after being joined by its tributary the Snake. Rain-bearing winds penetrate through this gap and

permit much wheat to be grown (Fig. N.A.29), whilst apples are grown under irrigation in the valleys. A huge project has converted an old course of the river into a reservoir (Grand Coulee Reservoir) and much more land can now be irrigated and power generated.

The *Basin and Range Province*, including the *Great Basin* (formerly called the Great American Desert) lies farther south. As its name implies, it consists of many flat, dry plateaus separated by ranges. Many of the basins were once lakes and in some the water has not completely dried up and salt lakes remain. The most famous is the Great Salt Lake of Utah, which is so shallow that a railway has been built across it. Salt Lake City was founded by the Mormons, who developed a wonderful system of irrigation from mountain streams. The Mormons sought this haven of refuge where they might follow their own religion in peace. In the pioneer days when there was much work to be done and few people and when many men lost their lives in fights with Indians, a man was allowed to have more than one wife but that is no longer the case.

The *Colorado Plateau* is famous for the Grand Canyon of the Colorado River—a gorge over 4,000 feet deep with almost vertical sides. The Plateau is dry but the river derives its water from the mountains and lower down the highest dam in the world—Boulder Dam—has been constructed across the river. From the reservoir so formed millions of acres near the Mexican border are irrigated and great crops of early vegetables, semi-tropical fruits such as melons, and cotton are raised. Power is generated at the dam and supplied to Los Angeles.

Taking the plateaus as a whole, mining is the most important occupation. Here are produced three-quarters of the gold of the United States, most of the silver, copper and lead (Fig. N.A.31). It was gold that attracted the first settlers but many of the deposits first worked have been exhausted.

The Pacific North West. The forested coastal ranges and the rich, sheltered valleys in the south of British Columbia extend southwards into the United States. The large Willamette valley and the lowlands round Puget Sound grow fruits similar to those of British Columbia. The forests of Douglas

Fir are extensively worked and this is now the chief lumbering region of the country. In this region is the port of Seattle (see Fig. N.A.11), which has a large trans-Pacific trade, as well as a trade with the United States' possession of Alaska in the north.

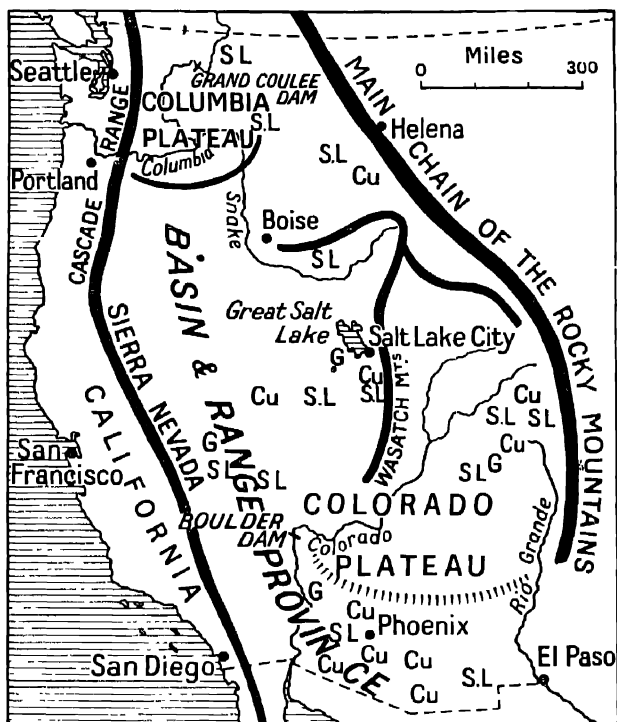


FIG. N.A.31.—The Rocky Mountain Plateaus.

Cu=Copper

S=Silver

L=Lead

G=Gold.

The Mediterranean Region. The central Pacific coast of America receives its rain in winter and has hot dry summers. This "Mediterranean Region" stretches from the borders of Mexico (32° N.) to about 42° N., and includes a large part of the State of California. The region is bounded inland by the lofty crest of the Sierra Nevada. Along the coast are the Coast Ranges. Between the Sierra Nevada and the Coast

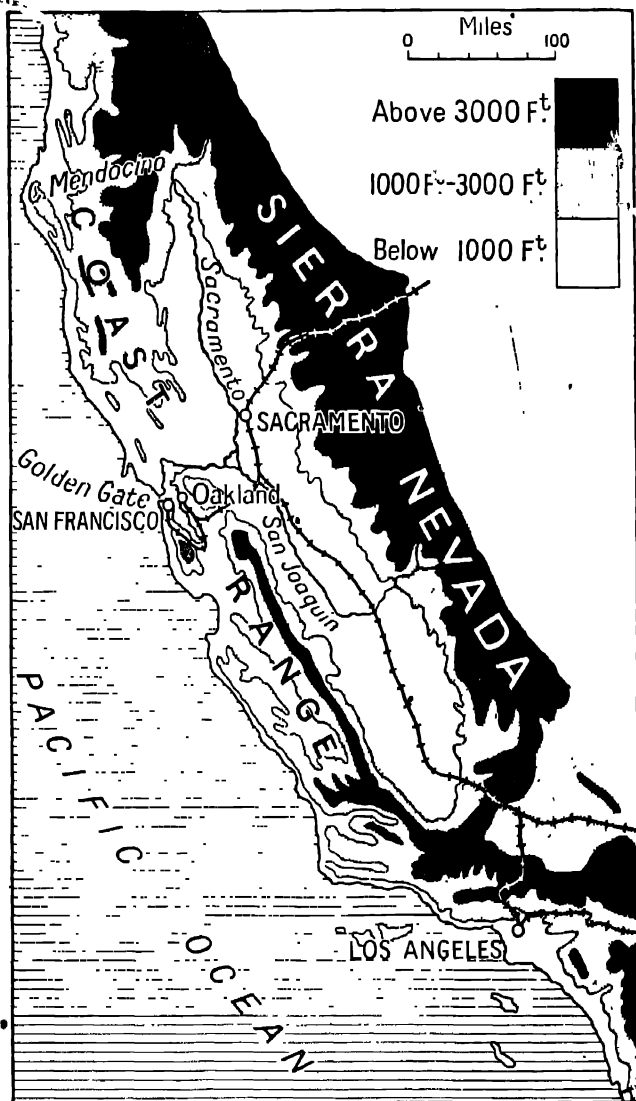


FIG. N.A.32.—The Mediterranean region of America.

Notice that only one main railway goes directly eastwards from San Francisco across the Sierra Nevada

Ranges is the great valley of California. The valley is drained by two rivers—the Sacramento in the north, and the San Joaquin in the south. The Coast Range has been broken through at one point by a gap only a mile wide, known as the Golden Gate, now spanned by a suspension bridge. Guarding this gap is the great port of San Francisco. The Coast Range gets a good rainfall and has some magnificent forests including in the north the redwoods with the oldest and largest trees in the world. The valleys behind are sheltered and dry. Large tracts are now irrigated and used for fruit farming. Wheat and barley are grown, but California is famous for its fruits, and the fruit-canning industry is an important one—peaches, apricots, pears, plums, cherries, etc., are all grown and canned, whilst grapes are grown and dried as raisins. *Sacramento* in the valley is the State capital, but a far larger town is *San Francisco*. In the south of California are some of the largest oilfields in the United States—centring round the town of *Los Angeles*. *Los Angeles* is also the centre of the movie or cinematograph industry, and has grown very rapidly. It is now larger than San Francisco. The hill ranges here run roughly east to west and in the sheltered valleys are huge citrus orchards from which oranges and grape-fruit are sent not only to all parts of America but also to Europe.

Notice the two main railway lines which connect central California with the eastern states. The railways start from Oakland opposite the port of San Francisco, but Oakland and San Francisco are now linked by a road bridge.

Alaska. In the north-west of the continent, Alaska belongs to the U.S.A. and became a State in 1959. It is a large area, six times the size of Great Britain, or more than twice the size of Texas, but large parts are too cold or too remote to be of great use. It has, however, valuable minerals and produces quantities of gold and copper. Notice the course of the Yukon River, which is open to traffic for two or three months of the year. In the heart of the country is *Fairbanks*, reached by rail from Anchorage. The far north is inhabited by small numbers of Eskimo, the south-west by Aleuts, and along the southern coastlands are various groups of American Indians.

About half the population, still very small, consists of white settlers. Many of these live in the south-eastern extension of the country, a narrow tract of forest covered mountains and deep fiords known as the Pan-handle. Here fishing (especially for canning) and lumbering are very important and the towns (all ports) include *Juneau* the capital and *Skagway*.

Trade of the United States. The United States forms such a huge territory, and has such a range of climate and productions, that she could be almost self-supporting. But the United States has a large foreign trade—about the same in

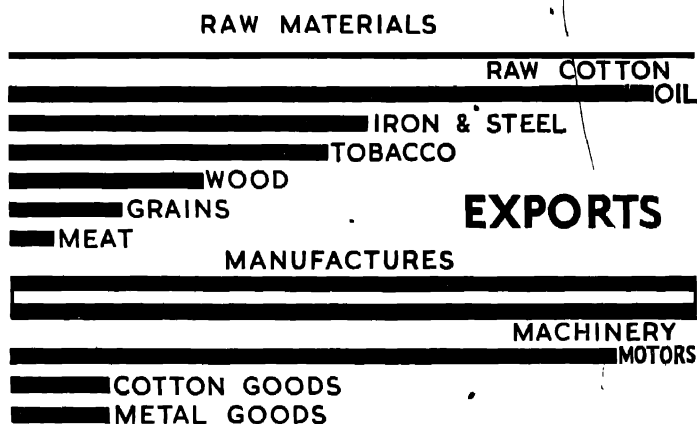


FIG. N.A.33.—The exports of the U.S.A.

As American manufactures develop there is less raw cotton, foodstuffs and raw materials for export but more manufactures.

normal times in value as that of Britain. The imports are mainly raw materials which are produced in countries having a warmer climate than the U.S.A.—cane-sugar, coffee, rubber, silk, jute, etc. The exports are both agricultural products and manufactured goods. The most important include mineral oils, cereals, and raw cotton—sent largely to Great Britain, Canada, France, Germany, and Japan. Study Figs. N.A.33 and N.A.34 carefully.

Trade between Great Britain and the U.S.A. In the eight years 1922 to 1930 the trade between the United Kingdom and the United States varied between £245,000,000 and

£300,000,000, roughly one-seventh of the total trade of Britain. The important goods sent to the U.S.A. were textile goods, including linen, iron and steel manufactures, and whisky, while from the U.S.A. were purchased many manufactured goods and much raw material, especially raw cotton, wheat, oil, tobacco, canned fruits, lard, hams, and machinery. By 1957 the trade had increased to £750,000,000 or one-tenth of Britain's trade. Whereas imports into Britain used to be valued at four or five times the exports from Britain to the United States now they are in the proportion of 2 : 1.

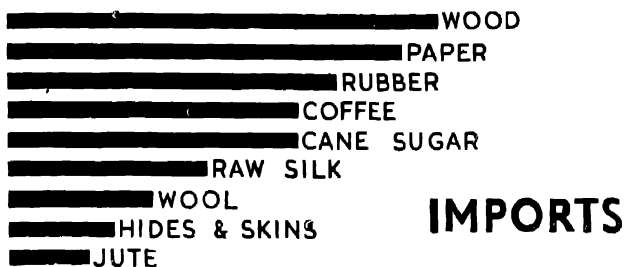


FIG. N.A.34.—The imports of the U.S.A.

In the years following World War II imports were only about one-third the value of exports.

Communications. The United States has two great systems of inland waterways. One is the Great Lakes system. Lakes Superior and Huron are joined by the "Soo" Canal—the total tonnage of vessels passing through this canal is three times that passing through the Suez Canal. It has been mentioned under Canada that the Welland canal connects Lakes Erie and Ontario, so that vessels can pass right from Lake Superior to the Atlantic Ocean. But only the smaller ocean vessels can do this. The Erie Canal connects Lake Erie with the Hudson River and so with New York, but is not fully used.

The Mississippi and its tributaries form the other great water highway. But it flows southwards and most of America's internal trade is from west to east.

The United States has a quarter of a million miles of railway—the American railways are long enough to go round the

world at the equator ten times. Just as in Canada, the agricultural development followed the railways—the railways made it possible. But now many branch lines are being closed; more and more goods go by road and passengers by air. In the United States and Canada it is rare to find a family without a car; there are over 55,000,000 private cars in use and over 10,000,000 trucks in the United States alone.

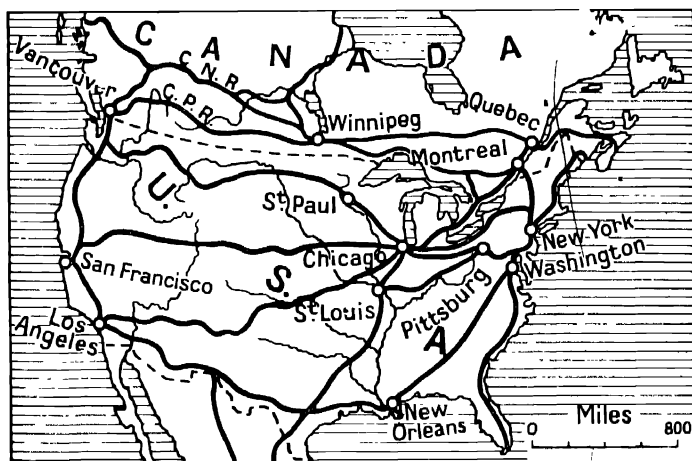


FIG. N.A.35.— The main railways of North America.

Notice that there are two main trans-continental railways in Canada and four in the U.S.A.

QUESTIONS AND EXERCISES

1. Write as full an account as you can of the mineral oil industry of the U.S.A.
2. Compare the Interior Grasslands of U.S.A. with those of Canada.
3. Give an account of the coal and iron fields of North America.
4. Compare carefully the Mediterranean Region of North America with those of Europe and Australia.
5. Account for the importance of each of the following (use sketch-maps): New York, Chicago, Duluth, Salt Lake City, Los Angeles, and Seattle.
6. Describe and account for the Great Salt Lake.
7. Draw a section across the United States from San Francisco to New York, marking the principal occupations of the people along the line of section.
8. Compare the cotton-growing industry of the United States with that of India.

9. Draw a sketch-map of the Great Lakes, marking important towns and lines of communication.

10. Describe as fully as you can the New England States, their people and occupations.

11. How can the Panama Canal affect the trade between Great Britain and the United States?

12. Write an account of the trade between Britain and the United States.

MEXICO

Mexico is a large republic, six times the area of the British Isles, and with a population of 32,000,000. Mexico was a colony of Spain from 1521 to 1822, and most of the inhabitants are descended from Spanish settlers and from the native American Indians. The country has been very unsettled, and there have been many revolutions within the last hundred years.

Mexico consists of a broad high plateau, a continuation of the Cordilleran Plateaus of the United States with a coastal plain on either side. On the west is the long mountainous peninsula of Lower California, in the south-east is the lowland peninsula of Yucatan. The tropic of Cancer runs right through Mexico, so the eastern coastal plain is hot and enjoys a good rainfall. The slopes of the plateau are cooler, but attract a good rainfall. But the surface of the plateau is 4,000 to 8,000 feet above sea-level and cut off from the influence of the sea. The days are hot and the nights cold; there is a great difference between summer and winter. The plateau gets particularly hot when the sun is overhead and a small monsoon is caused, bringing rain from east and west in the summer. Lower California is in the desert belt and remains dry.

The Tropical Coastlands are suitable for cane-sugar, rubber, vanilla, and tobacco, and in settled times good crops are obtained. Sisal hemp comes from Yucatan.

The Temperate Hill Slopes produce good coffee and large quantities of maize, which is the staple food of the people. Where the rainfall is poor, small tracts are irrigated.

The Plateau usually suffers from poor and uncertain rainfall and irrigation is usually needed for cotton, wheat, and maize. Many sheep and cattle are reared. The most fertile part is the south around Mexico City.

Mexico is famous for its mineral wealth. Mexico produces nearly half the world's silver and huge quantities of copper. There are also deposits of iron and coal. These minerals come from the plateau, especially near *Mexico City*. On the flanks of the mountains are the famous oilfields which were first worked about 1910. Mexico produces less oil than formerly but still about $2\frac{1}{2}$ per cent. of the world's supply. *Tampico* is the great oil port. Mexico has not yet developed many industries. Hydro-electric power is available, and a few cotton goods are made at *Vera Cruz*. Mexico is the largest city, capital of the republic, and near the important silver-mining regions.

CENTRAL AMERICA

Central America consists of the six small republics of Guatemala, Salvador, Honduras, Nicaragua, Costa Rica, and Panama, with the British Colony of Honduras. A broad backbone of mountains runs through the countries; it narrows gradually to a single chain in the Isthmus of Panama. There is a narrow coastal plain on either side of the mountains. The rainfall on the Atlantic side, being derived from the Trade Winds, is heavier than on the west. As in Mexico, it is possible to distinguish:

(a) Tropical plains, producing sugar, bananas, coconuts, and hard timbers.

(b) Temperate hill slopes, producing coffee.

(c) Cool grass-covered highlands.

As in Mexico, the inhabitants are of Spanish Indian descent.

The Republic of Panama occupies the narrowest part of the isthmus between North and South America. Many years ago the Frenchman who built the Suez Canal tried to construct a canal across the Isthmus of Panama, but he failed. In 1904 the United States purchased a strip of land ten miles wide from Panama and spent £100,000,000 in building the Panama Canal. The canal was finished in 1914. The canal belongs to the United States, but it may be used by vessels of all nations on equal terms. Every year 8,000 to 9,000 ocean

steamers go through the canal, American and British leading. The canal is about thirty-six miles long, but for more than half the distance it runs through an artificial lake. The Panama Canal was much more difficult to construct than the Suez. The Suez Canal passes through flat land, but the Panama Canal has to cross a ridge of hills. This it does by means of

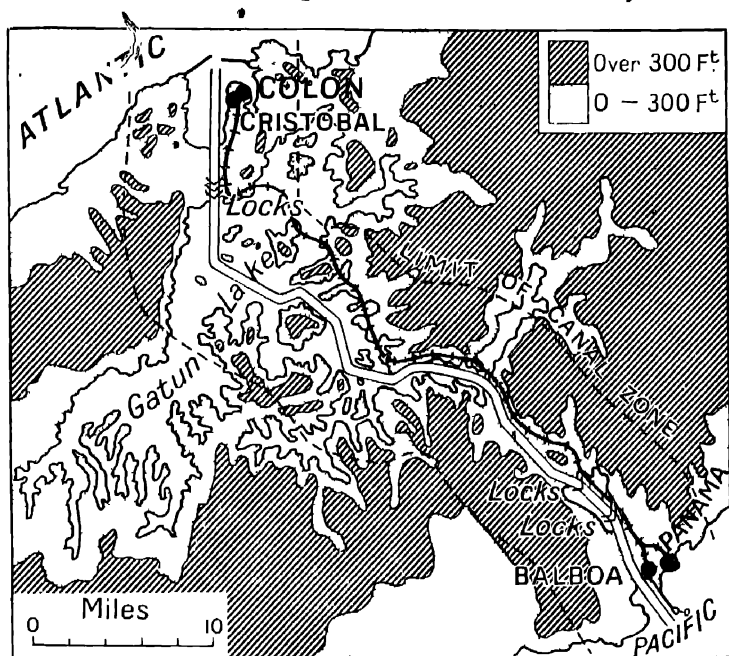


FIG. N.A.36.—The Panama Canal.

For more than half of its course the canal runs through the artificial Gatun Lake. Notice the hilly nature of the Isthmus, the curved course of the canal, and the three locks at each end.

three great locks towards each end. The town at the northern or Atlantic end is *Colon* (though the port is called *Cristobal*); at the southern or Pacific end is *Panama*. The Panama Canal is of great importance to the United States because it allows ships to ply between her west coast ports and her east coast ports, and the whole American fleet could quickly be transferred from the Atlantic to the Pacific Ocean or *vice versa*.

Notice, too, how it facilitates trade between the busy manufacturing states round New York and the South American countries of Chile and Peru. Notice from an atlas that the west coast of South America is almost due south of New York. The canal affords Australia and New Zealand an alternative route to Europe which is now largely used.

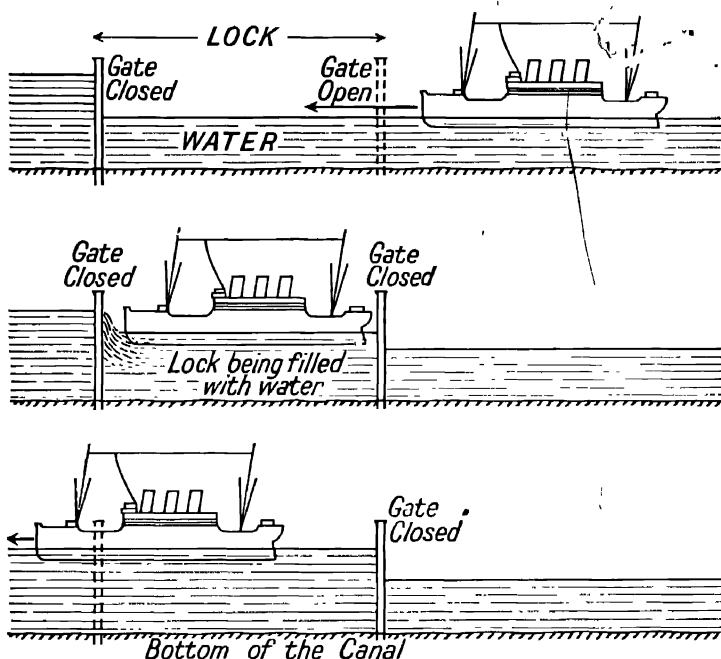


FIG. N.A.37.—Diagram to show how a lock on a canal is worked.

British Honduras, capital Belize, is about the size of Wales or Vermont and has valuable forests producing mahogany that are little developed.

THE WEST INDIES

The West Indies were so called because they were discovered by Columbus when he was trying to find a new ocean route to India and he thought he had reached a part of India. They

consist of four large islands and a large number of smaller ones. Nearly the whole of the group lies within the Tropics.

Cuba is a republic but was greatly helped in development by the United States. Cuba produces one-third of the world's supply of cane-sugar and much of the sugar is exported to the United States. Cuba is also famous for its tobacco, used especially for cigars which are exported from the capital and principal port of Havana.

Puerto Rico is a much smaller island belonging to the U.S.A., and again sugar-cane and tobacco are the leading products—together with some coffee.

Hispaniola is divided between two Negro republics, Haiti and Dominica, the Negroes being the descendants of liberated African slaves. Both republics are comparatively undeveloped.

Jamaica, part of the British Commonwealth, is famous for its cane-sugar and bananas, which are exported through the ports of Kingston, Montego Bay, and Port Antonio. Recently there has been an important production of bauxite sent to Canada for the extraction of aluminium.

Though only half the size of Wales, the Blue Mountains in Jamaica rise to seven thousand feet and great differences in climate result. There are fine bathing beaches which attract tourists, but with over $1\frac{1}{4}$ million people the island is very crowded and there is much emigration.

The smaller islands of the West Indies, known as the "Lesser Antilles," belong mostly to the British Commonwealth, though some are French and Dutch. Most of them produce cane-sugar, some produce limes, cocoa, and sea-island cotton. Some are very mountainous, have a heavy rainfall and are largely forested. Examples are Grenada, St. Vincent, St. Lucia and Dominica. Others are flat coral islands, notably Barbados, (sugar-cane covers half the island) Antigua and the Bahamas. The British island of Trinidad lies off South America and it is separated from the mainland by only a narrow channel (see p. 648.) The British West Indies became more closely linked together in 1957 when they formed a Federation.

Bermuda (or the Bermudas) consists of low coral islands in the midst of the North Atlantic ocean. They are bathed by the warm Gulf Stream and the wonderful climate makes them


popular with American visitors in winter since New York is only 680 miles away. They have been British for three hundred years.

QUESTIONS AND EXERCISES

1. Why is the Atlantic the busiest ocean in the world?
2. Write a brief account of the climate of North America.
3. What are the principal trans-continental railways of North America? Which do you think is the most important, and why?
4. Write a description of transport in North America other than railway. Draw a sketch-map to illustrate your answer.
5. Why were the eastern coastlands for long the most developed region of the continent?
6. Do you consider Cuba to be of importance to the United States? Give reasons.
7. Give a full account of the Appalachian System using the headings: Position, Structure, Vegetation and Products, Occupations of the People.
8. Divide North America into natural vegetation belts, describing each one briefly.
9. Describe and account for the deserts of North America.
10. How far can Australasia and United States be considered rivals as far as their exports are concerned?
11. Compare and contrast New Orleans and Montreal as important ports of North America.
12. Write an account of the trade between Great Britain and (a) Canada, (b) United States.
13. If you were emigrating to North America, in which part would you choose to settle, and why?
14. What possibilities of development are there for the North American Arctic?
15. What were the geographical causes of the struggle between England and France during the early settlement of North America?
16. Draw a section across Mexico showing the natural regions.
17. Study the climate of Central America and show why it is able to grow certain products which cannot be obtained in the United States.

SOUTH AMERICA

POSITION AND SIZE

 SOUTH AMERICA has an area of about 7,000,000 square miles, or roughly the same as the United States and Canada combined. Notice that the equator passes through the mouth of its greatest river, the River Amazon. The Tropic of Capricorn passes roughly through the middle of the continent, but the whole continent is wedge-shaped so that more than two-thirds of its area is within the tropics—which accounts for its being of less importance than North America. Note carefully the position of longitude 60° W. as being a central meridian for the continent. South America is almost an island, being joined to North America by the narrow Isthmus of Panama, which has, indeed, been cut through by the Panama Canal.

PHYSICAL FEATURES

Notice that South America has few indentations in its coast. With the exception of Africa, it has the least length of coast-line for its size of all the continents. Study Fig. S.A.2 and see how South America falls into a few well-defined physical units, remarkably like those of North America. These units are:

- (1) The narrow coastal strip bordering the Pacific Ocean.
- (2) The great fold ranges of the Andes—broad in the north and consisting of several ranges with plateaus in between, but narrowing to one main range in the south.
- (3) The central plains.
- (4) The eastern highlands—formed of two plateaus of old, hard, crystalline rocks, separated by the Amazon River. The two plateaus are the Guiana Highlands in the north, and the Highlands of Eastern Brazil in the south.

In reality the Central Plains comprise four areas from north to south:

(a) The basin of the Orinoco (the Llanos, or grassy plains).

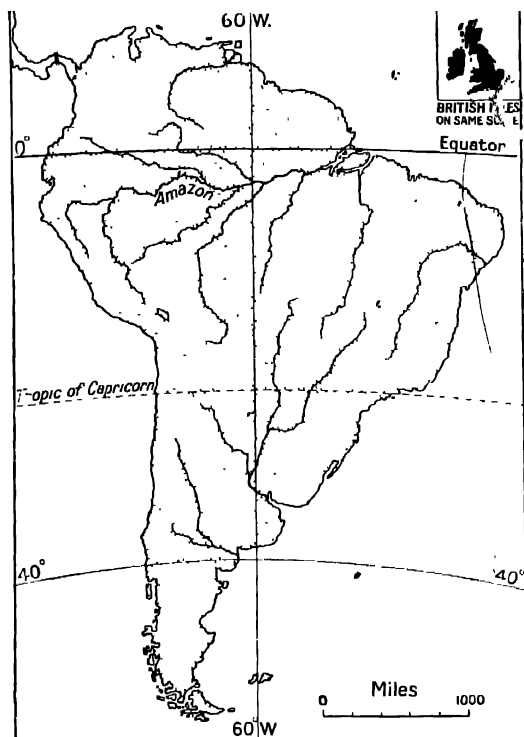


FIG. S.A.1.—The position and size of South America.

(b) The great basin of the Amazon (the Selvas, or Equatorial Forests).

(c) The basin of the Parana-Paraguay Rivers.

(d) The Argentine Pampas and the Patagonian Desert, the latter a plateau not a lowland.

Rivers. There are five important river systems in South America, one corresponding to each of the divisions of the Central Plains, and a fifth system—that of the Cauca and Magdalena—draining the northern ranges of the Andes.

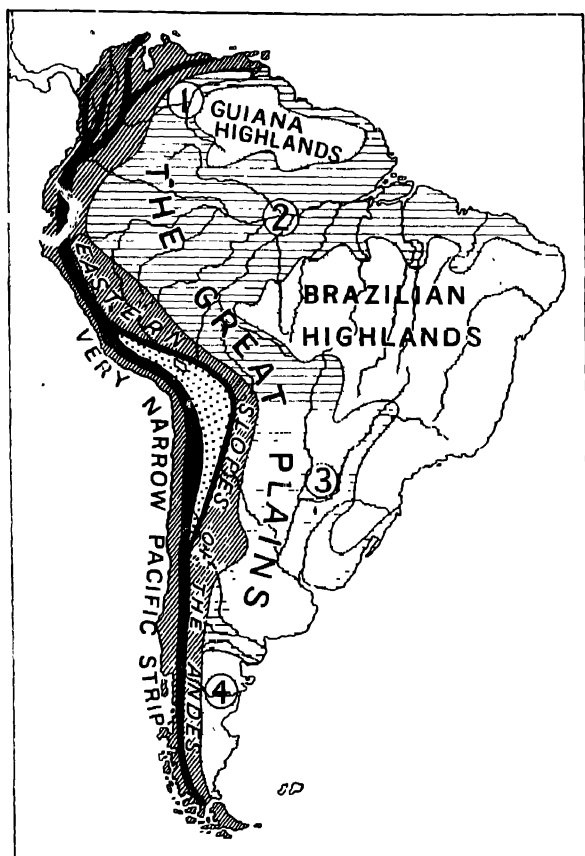


FIG. S.A.2.—The main physical features of South America.

1= The basin of the Orinoco, 2= The basin of the Amazon; 3= The basin of the Parana and Paraguay Rivers; 4= The Argentine Pampas and Patagonian Desert. Compare the structure of North America. Notice that Patagonia is a plateau, not a lowland.

GEOLOGY AND MINERALS

As we have learnt to expect, metallic minerals are associated with the old hard rocks and fold ranges. The Pacific coastal strip has a curious mineral industry which is, however, associated with its dry desert climate. That is the nitrate

industry of Chile. The great fold range of the Andes was uplifted mainly in late geological times—in Tertiary times. Indeed, some of its peaks are active volcanoes, the most notable being Chimborazo and Cotopaxi. Valuable deposits of silver, copper, and other ores occur in the older parts, especially in the broad high plateau of Bolivia. We have noticed in other parts of the world that oilfields are often found on the margins of fold mountains. Such is the case in South America, and valuable oilfields have been found on the flanks of the Andes—in the Maracaibo Basin of Venezuela, in Peru, Colombia, and Argentina.

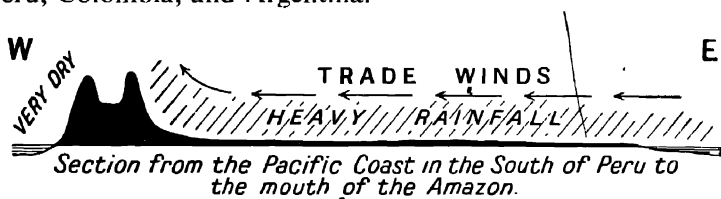


FIG. S.A.3.—Sections across South America from west to east

CLIMATE

The climate of South America is controlled to a great extent by its physical features, but especially by the great chain of the Andes. The northern two-thirds of the continent are dominated by the Doldrums and the Trade Winds—blowing from the north-east and south-east. The Amazon basin comes under the influence of the Doldrums twice a year (when the sun is overhead) and receives a heavy convectional rainfall. The regions to north and south are mainly dependent on the Trades for their rainfall. As these winds are moving to warmer latitudes they are poor rain-bearers unless they have first crossed a large expanse of ocean and then been forced to

ascend as by high land. By the time they have crossed the Andes and reached the western side of the continent they are dry, so that on the Pacific Coastal Strip we find the curious feature of a long, narrow, almost rainless desert bordering the ocean. The southern third of the continent is under the

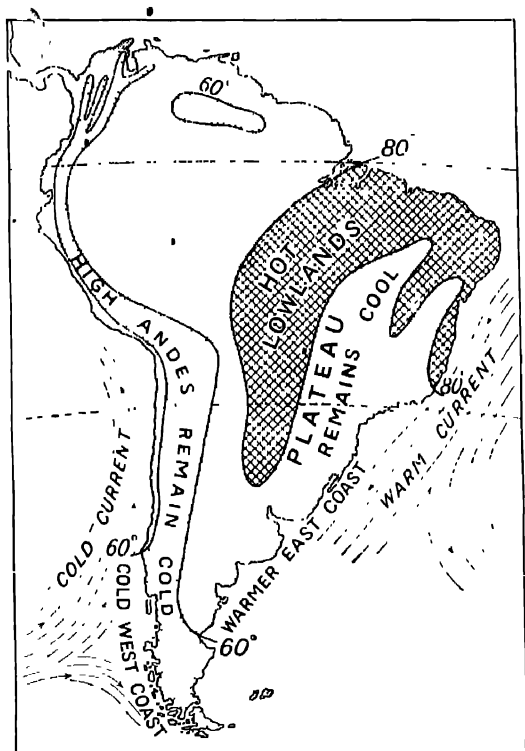


FIG. S.A.4.—The temperature of South America in January (hot season).

influence of the North-Westerly winds of the mid-latitude belt, which bring abundant rainfall to the southern part of the Pacific Coastal Strip. The mountains again extract most of the moisture from the winds, so that here in the south we find desert again, but this time on the Atlantic side of the Andes—the Patagonian Desert. When the sun is in the

south—that is, shining over the southern Tropic, there is a strip of the western coast which is under the influence of the Trade Winds—dry because they have passed over the Andes. But when the sun is shining over the northern Tropic this strip comes under the influence of the Westerlies. It has then a

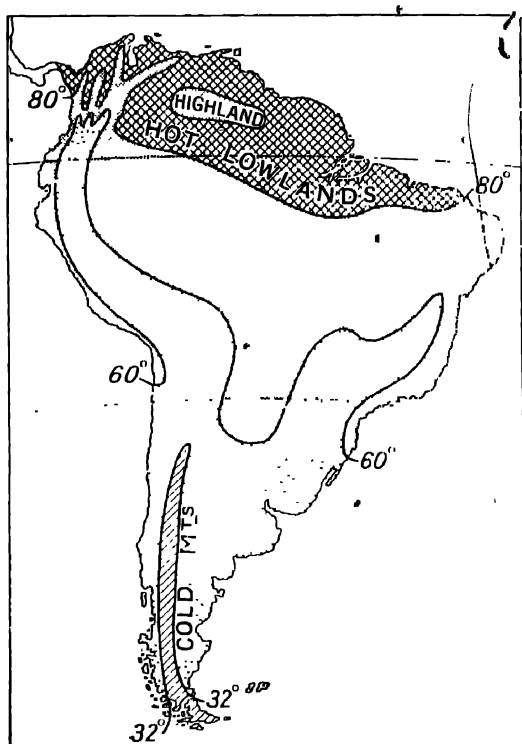


FIG. S.A.5.—The temperature of South America in July (cold season)

Mediterranean climate—hot dry summers and warm moist winters. The town of Valparaiso is in the north of this belt. Remember that the seasons are the reverse of those in the Northern Hemisphere.

Temperature—Conditions in January. At this period of the year the sun is shining early over the Tropic of Capricorn.

The hottest regions are the lowlands south of the equator. Notice the very remarkable fact that the east coast is warmer than the west coast. As in Australia, Fig. S.A.4 shows that the west coast is influenced by winds blowing from over the cold Peruvian current coming from Antarctic regions. This is a

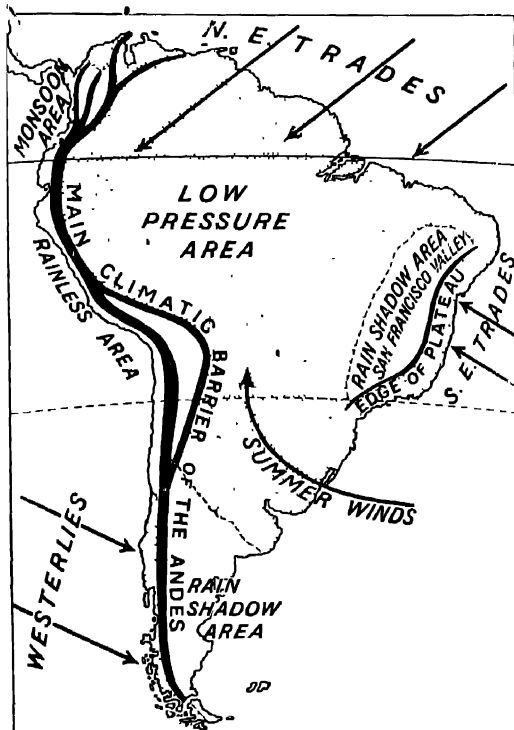


FIG. S.A.6.—The mountain ranges and regular winds of South America.

Compare this map very carefully with the rainfall map

good example of the influence of a cold current on temperature of neighbouring lands.

Temperature—Conditions in July. At this period of the year the sun is shining vertically over the northern Tropic. The hottest part of the continent is in the north, and the

southern part of the continent is colder. Notice that the influence of the cold current on the west coast is still seen, not so markedly as in the summer. Compare the temperature of Para—nearly on the equator—in Fig. S.A.5 and Fig. S.A.6. Notice it has a typically equatorial climate—nearly 80° throughout the year.

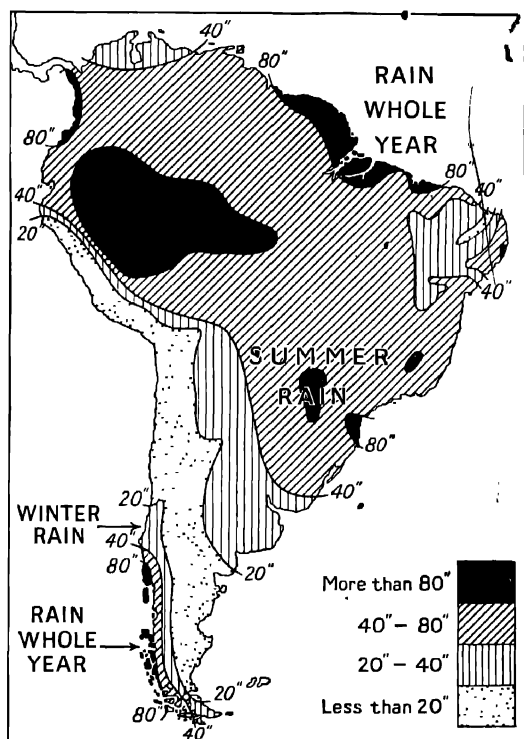


FIG. S.A.7.—Rainfall map of South America for the whole year.

whole year round. Quito is also on the equator but is 9,000 feet above sea-level, and so has a very pleasant cool climate all the year. Its temperature is roughly 55° for the whole year.

Winds and Rainfall. Fig. S.A.6 shows how the regular winds are dried in crossing the great mountain ranges. The influence of this on rainfall is well seen in Fig. S.A.7. The saying “rain

follows the sun" is true of South America. When the sun is in the south there is a heavy rainfall over the greater part of the continent. The following points should be noticed on the map:

(1) The heavy rainfall over the Amazon River (Equatorial belt of rain at all seasons or Doldrums).

(2) The dry Pacific coastal strip.

(3) Patagonia is dry, being on the lee of the Andes.

When the sun is in the north, over the Tropic of Cancer, the heaviest rainfall is in the north. The Amazon River is still in the heavy rain belt, and the Pacific coastal strip is still dry, but Valparaíso is now within the influence of the westerly winds and is receiving some rain (Mediterranean region). Patagonia is again dry, being still on the lee of the Andes.

In the United States there is a tendency for the rain-bearing winds to blow up the Mississippi Valley. Similarly in South America the rain-bearing winds tend to blow up the Parana-Paraguay Valleys and right up the Amazon Basin. In eastern Brazil the rain-bearing Trade Winds are dried in crossing the edge of the plateaus, and so the São Francisco Valley is very dry. Compare the Murray Basin. The coast enjoys a moderate rainfall, but the winds do not penetrate to the interior of the plateau, with the result that the surface of the latter is somewhat dry. In the north-west of the continent, along the Pacific coast of Colombia, the rainfall is increased by a monsoon.

NATURAL VEGETATION

The natural vegetation of South America reflects the climatic conditions. The hot wet lowlands of the Amazon Basin and the coastal plain are covered with very dense Equatorial Forests. The Amazon Basin is the largest area of Equatorial Forest in the world. The plateaus lying in the Tropics (Plateaus of Guiana and Brazil), as well as a large part of the Orinoco Basin, are occupied by Tropical Grasslands, or Savanas. The grasslands of the Orinoco have received the special name of Llanos. South of the Brazilian Highlands are warm Temperate Forests, passing into the Mid-Latitude Grasslands of the Argentine, which in turn become drier and

pass into the mid-latitude Desert of Patagonia. On the west of the Andes a hot desert occupies the rain-shadow area in the Tropics. South of this is the small area of Mediterranean vegetation, which in turn passes into Cool Temperate Deciduous Forests. Follow all these points carefully in Fig. S.A.8.

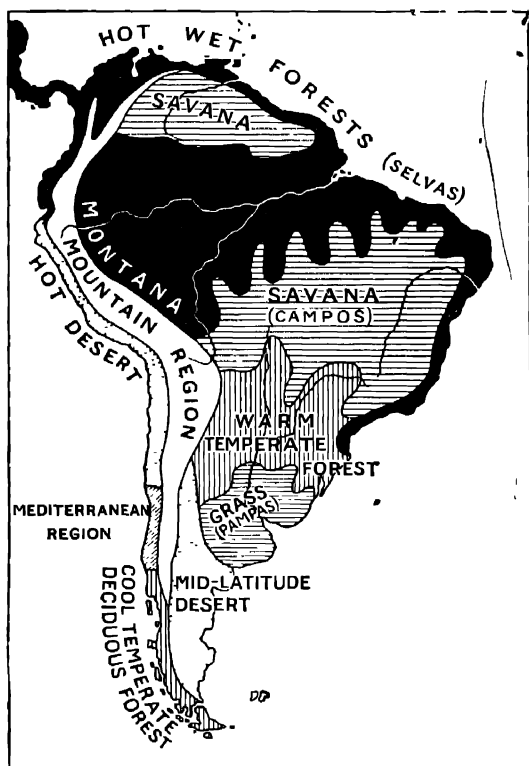


FIG. S.A.8.—The natural vegetation of South America.

NATURAL REGIONS

Combining what we have now learnt of the physical features, the climates, and vegetation, we are now in a position to divide South America into its major Natural Regions. We can take each of the main physical regions, and we shall see that we can

divide each up according to climate and vegetation. Fig. S.A.9 gives a key to these regions.

(1) **Natural Regions of the Pacific Coastal Strip.** (a) Wet Region in the north, as far south as the equator.

(b) Desert Region of North Chile and Peru. Very little rain and of little importance. Great areas of this dry region, however,



FIG. S.A.9.—The major natural regions of South America.

yield large quantities of a salt known as nitrate, which is valued in the agricultural countries of Europe as a fertiliser. This salt occurs as a crust over the surface of the desert. Were there any rainfall it would all dissolve and be washed away. Most of the towns in this dry region are nitrate ports and also serve as outlets to mountainous regions behind.

(c) The Mediterranean Region, a narrow strip south of Valparaiso enjoying a Mediterranean climate and having the usual Mediterranean products.

(d) The Cool Temperate or mid-Latitude Deciduous Forest Region with heavy rainfall and covered with forests.

(2) **The Andean Chain.** (a) The Northern Andes, consisting of several parallel chains separated by the fertile valleys of the Cauca and Magdalena.

(b) The broad Central Andes, chiefly noted for mining.

(c) The narrow Southern Andes, acting as a divide between east and west.

(3) **The Central Plains.** (a) The Basin of the Orinoco and lowlands fringing the coast, enjoying a tropical climate and, where developed, producing such characteristic tropical products as sugar and cocoa. The natural vegetation is mainly coarse grass, and the grassland country is known as the Llanos.

(b) The Amazon Basin. Most of this immense basin falls within the belt of equatorial rain at all seasons, and is clothed with dense Equatorial Forests (Selvas) of huge hardwood trees. Like other regions of dense tropical forest, it is sparsely populated by backward tribes. It is the home of the most important of the rubber-bearing trees, but the best trees growing wild have been found and killed by careless tapping, so that the great rubber-producing regions of the world are now the plantations of Malaya and Ceylon.

(c) The Basin of the Parana-Paraguay and the Pampas. The north of this region is forested, with an open savana type of forest forming a region known as El Gran Chaco—the great hunting ground. To the south, in the Argentine, are the Pampas or mid-latitude grasslands which now form one of the great wheatlands of the world.

(d) The Patagonian Desert. The northern part of this region supports a few sheep, but the greater part is a dry waste of shingle and sand, except along valleys where water is available. In the extreme south this cool mid-latitude desert passes into land where there is enough rain to produce sheep pastures.

(4) **The Eastern Highlands.** (a) The Highlands of Guiana

and Venezuela. This region has great mineral resources, but is little developed, owing largely to difficulty of access.

(b) **The Brazilian Highlands.** This region of old crystalline rocks has vast mineral resources. The coastal portion has a rich soil and a tropical climate, ideal for coffee and other tropical products.

POPULATION

The original inhabitants of South America, when the continent was discovered by Europeans in the fifteenth and sixteenth centuries were American Indians—some groups, like the Incas on the plateaus of Peru, were highly civilised. Most of the pure-blood Indians now remaining are very backward tribes living in such poorly developed and inhospitable tracts as the dark forests of the Amazon. The civilised nations now inhabiting South America are descended mainly from the Portuguese and Spanish conquerors who settled in the country and inter-married with the Indians, and Spanish is the usual language over most of the continent except Brazil, where Portuguese is spoken. In the northern countries many negroes were introduced for labour in the plantations, whilst of recent years large numbers of European immigrants, especially Italians but including many Germans and Spaniards, have

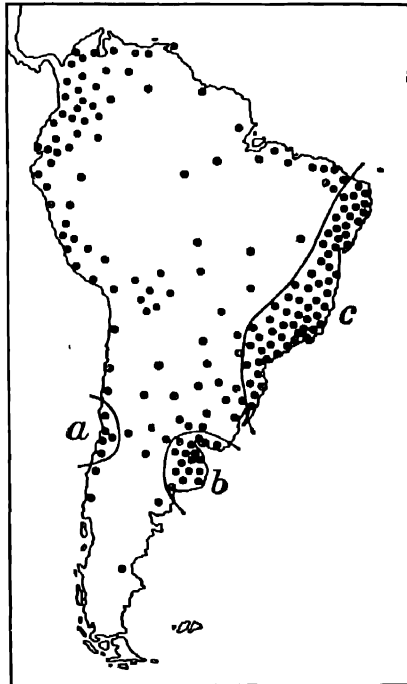


FIG. S.A.10.—The population of South America.

Each dot represents 500,000 people. Notice *a*, *b*, and *c*, the three areas of concentration of the population and the reasons for the concentration

settled in the more temperate lands of the south. For long Brazil, the largest country of South America, was a colony of Portugal, but now, with the exception of the small colonies of British, French, and Dutch Guiana, and the British island of Trinidad, all the countries of South America are independent republics. Notice from the population map that most of the continent is poorly populated. There are three areas of heavy population: (a) around Valparaíso, which enjoys a productive Mediterranean climate; (b) that part of the progressive state of Argentina around Buenos Aires where the climate is ideal for wheat and cattle; (c) that part of the plateau of the Eastern Highlands where soil and climate favour the growth of coffee, etc. The distribution of population is thus very strongly influenced by climate.

BRAZIL

Brazil, the largest country of South America, rivals in size the United States or Canada, and is of greater extent than Australia. The population, now over 60,000,000 is growing rapidly. It comprises several natural regions:

The Great Basin of the Amazon, covered with some of the loftiest and densest evergreen tropical forests in the world. The great highway is the Amazon, which annually overflows its banks and becomes of enormous width. It is navigable by ocean steamers right up to Manaos. This immense basin is almost uninhabited except by a few Indians. Para rubber is the only product of note, and that is gradually becoming less and less important in the world's supply, for the wild trees from which it is obtained have been largely killed by over-tapping and new trees are becoming harder and harder to find. Manaos is the collecting station for the rubber, and Para is the port at the mouth of the Amazon. Near Para rubber plantations have been established.

The Brazilian Highlands. This is another immense region, which consists mainly of ancient rocks and will probably one day become one of the most important mineral-producing regions in the world. In the south there are great iron and

steel works (though hampered by lack of coal) and skyscraper cities such as Belo Horizonte.

The most developed parts of Brazil are the strip along the Atlantic coast and the region of São Paulo. The climate of the coastal strip changes from equatorial in the north to tropical in the south, and the products vary accordingly.



FIG. S.A.11.—Political map of South America.

Cotton, sugar, rubber, and cocoa are the great products of the north, together with maize and the native foodstuff manioc. The great coffee-growing lands around the great city of São Paulo (with three million people) produce over half the world's coffee and lie on the plateau where there are fertile volcanic soils.

Southern Brazil. The southern region of Brazil adjoins

Uruguay and to some extent shares in the great cattle-rearing industry of the latter state. The forested parts yield maté, of Paraguay tea, now an export.

Railways. The main network of railways is around the fertile lands of São Paulo, connecting it with Rio de Janeiro (the capital and most beautiful modern city situated on a magnificent natural harbour and so the leading port) and Santos (the coffee port). This system also joins up with that

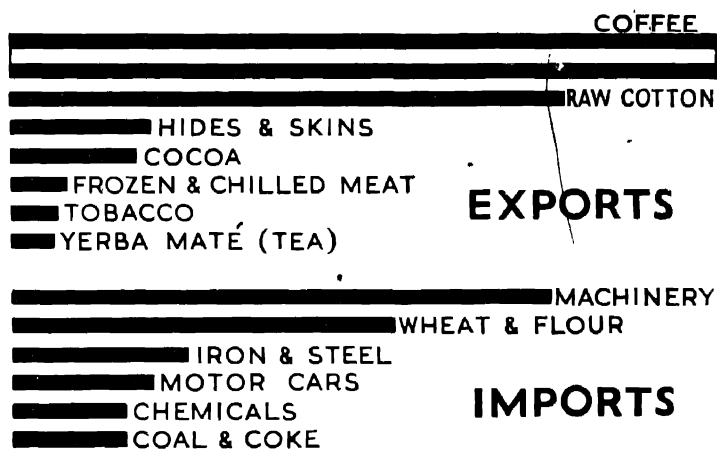


FIG. S.A.12.—The trade of Brazil.

of Uruguay. Farther north railways connect the coast towns of Bahia and Pernambuco with the valley of the São Francisco. The latter valley gives access to the great plateau, and is rapidly increasing in importance. Great use is made in Brazil of air transport and many roads are being built. A new capital, named Brazilia, is under construction on the plateau in the far interior.

ARGENTINA

Argentina or the Argentine Republic is the most progressive state of South America, largely because it has a considerable area of land with a climate ideal for white settlement and cultivation and which has made the Argentine one of the great

granaries of the world. Notice that the Argentine can be divided into several natural regions:

(a) In the north it includes part of the Tropical Forests of the Upper Parana-Paraguay Basin. This area is little developed and is inhabited chiefly by Indians. A little maté is produced and bark for tannin. In the north is also included a large part of the Chaco where some cotton is grown.

(b) The grasslands (Pampas) are by far the most important region. It is moister and warmer to the north-east, and so

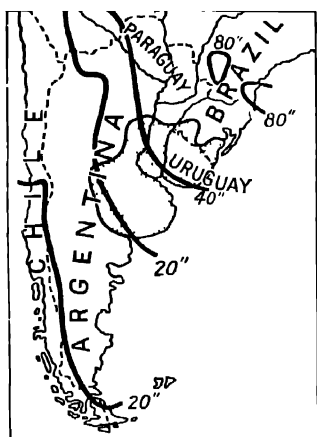


FIG. S.A.13.—The mid-latitude grasslands region of South America.

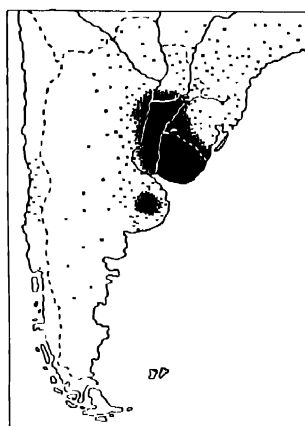


FIG. S.A.14.—The great cattle lands of South America.

Notice that they are situated almost entirely in the wetter eastern parts of the grasslands.

maize and flax seed are there very important; the great wheatlands are around Buenos Aires, to the south-east. Wheat cultivation is limited to the west and south by decreasing rainfall, but irrigation may partly extend the area. Fifty years ago, in the early days of the development of the Argentine, large numbers of cattle and sheep were raised for the sake of tallow and hides, and a little salted meat was exported. When the process of freezing or, better still "chilling" the meat so that it could be sent all the way to Europe in w.(e.)—21

quite fresh condition was introduced, the meat trade increased enormously and huge quantities of beef are now sent to Europe. Sheep are less important now than cattle because the grass has been improved and made suitable for cattle; moreover, wheat is using up much of the old sheep-farming lands. The grassland region centres of the

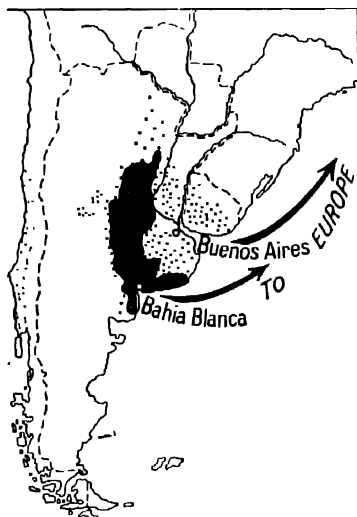


FIG. S.A.15.—The wheatlands of the Argentine and South America.

Notice that they are situated in the drier parts of the temperate grasslands, west of the cattle regions.

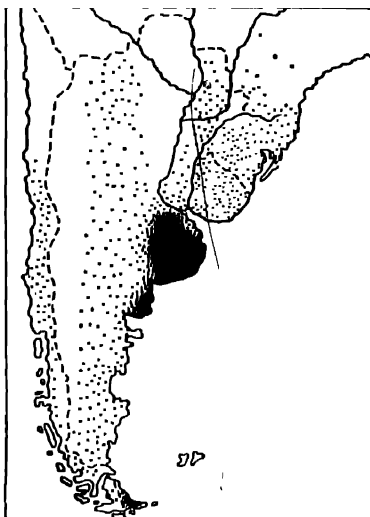


FIG. S.A.16.—The sheep lands of South America.

Notice that sheep are most abundant in the drier parts of the grasslands.

La Plata River—the estuary of the Parana-Paraguay River—and a great network of railways joins all parts of the wheatlands with the main ports, *Buenos Aires* (the largest city in South America), La Plata, Rosario, and Bahia Blanca. The harbours at these ports are not good natural harbours and have to be kept up at great expense.

Naturally the main trade of the Argentine is with the busy industrial countries of Europe which require meat and wheat.

The Argentine takes manufactured goods, coal, and oil in exchange. The manufacturing industries of the Argentine were connected with its pastoral and agricultural regions and

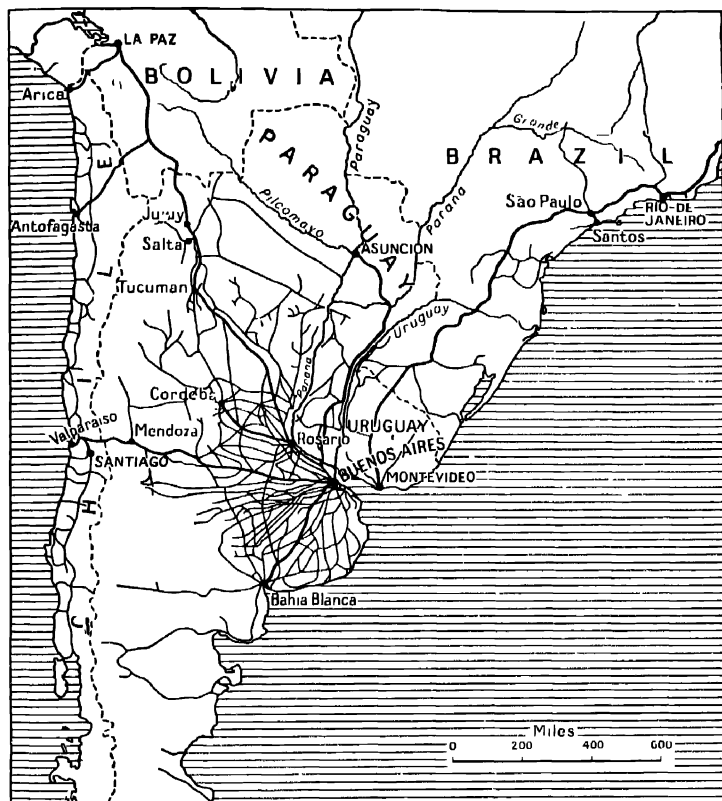


FIG. S.A.17.—The railways of the Argentine.

Notice the great network in the Pampas regions. The railways are of broad, standard, and metre gauge, very much mixed up.

include flour-milling, meat-freezing, dairying, etc., but great strides have been made in recent years in textile manufacturing and many other industries.

(c) Between the main grassland region and the Andes is an area which enjoys a warm sheltered, though dry, climate, almost Mediterranean in character. With irrigation from

Andean streams wine making can here be carried on, as well as fruit farming; whilst sugar, cotton, tobacco, and hemp can be produced. Tucuman (sugar) and Mendoza (wine) are the principal towns.

(d) Patagonia is mainly a great shingle desert of little value but on the more grassy slopes of the Andes and in the south sheep are important. In this region and the last oilfields have recently been developed.

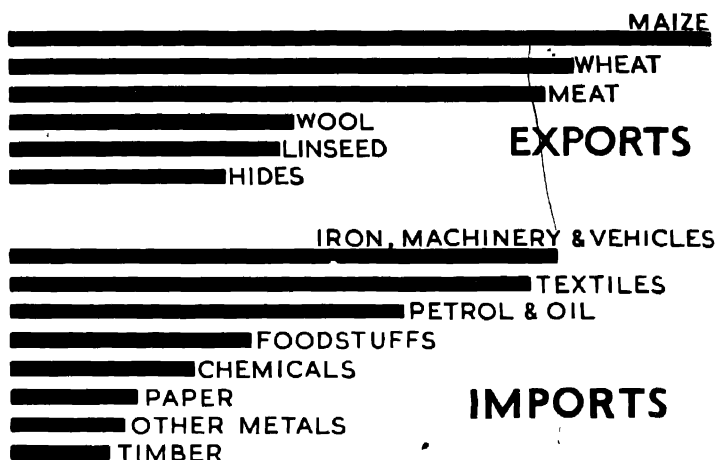


FIG. S.A.18.—The trade of Argentina.

The Parana and Paraguay are both navigable through Argentina, and require but little deepening to permit ocean steamers to ascend right into the forest region—indeed to the state of Paraguay. As well as the network of railways in the grassland region and the line via Mendoza across the Andes into Chile, there are railways from the coast to Tucuman and Bolivia. Unfortunately the Argentine railways suffer, like those of Australia, from a mixture of gauges—broad (5 ft. 6 in.), standard (4 ft. 8½ in.), and metre (3 ft. 3¼ in.).

The people of the Argentine are mainly of Spanish descent, but large numbers of Italians have migrated to the country in recent years.

PARAGUAY

Paraguay is a small republic, mainly between the Parana and Paraguay Rivers. It lies partly in the region of the Chaco as the northern part of Argentina, but on the east extends to the grasslands of the Brazilian Plateau. The grassland is by far the most important part of the country and is suitable for cattle. Maté, or Paraguay tea, from which a favourite South American drink is made, is produced.

Asuncion, on the Paraguay River, is the principal town, and can be reached by sea-going vessels. The inhabitants of Paraguay are mainly of mixed Spanish and Indian descent.

URUGUAY

This little republic is on the opposite (eastern) side of the La Plata estuary to the rich grasslands of the Argentine. It is equally suitable for cattle rearing and the production of maize. Meat forms the staple export of the country. The chief town and port is the fine city of *Montevideo*, from which there are railways to the centres of the meat-chilling industry. *Montevideo* has now an excellent artificial harbour.

CHILE

Chile is a long narrow state occupying the strip between the crest of the Andes and the Pacific Ocean. It is 2,500 miles from north to south, but is nowhere more than 200 miles wide. There is usually a coastal range, then a sheltered valley and then the foothills of the Andes. Turn to Fig. S.A.9 and notice that it comprises three natural regions, determined by climate:

(a) The Desert Region of the North (Atacama Desert), which is the great nitrate-producing region and which has other minerals such as copper and silver. The nitrate is exported through the port of *Iquique*, and especially through *Antofagasta*.³ The latter port also serves the mineral-producing regions of Bolivia, and exports silver and copper. *Arica* is a similar port to the north, near the Peruvian border. An important by-product in the purification of the nitrate is iodine.

(b) The Mediterranean Region around *Valparaíso*—the

largest port of Chile. This is the most productive and thickly populated part of Chile; its climate and products resemble those of Spain. The products include wheat and barley, wine and Mediterranean fruits. Sheep and cattle are also reared, the latter as the climate gets damper towards the south so that dairying is important around *Valdivia*. Chile can thus be classed as an agricultural country, and the goods it requires are manufactured goods—cottons, woollens, and machinery. The exchange takes place mainly through the port of *Vaiparaiso*, and, as we should expect, the trade is with such manufacturing countries as England, the United States, Germany, and France. *Santiago*, the capital, lies in the valley between the coast range and the Andes in this region. Notice that this region produces the food required by the mining districts to the north.

(c) The Forest Region of the South. Here the coast is, like that of western Scotland, deeply indented, intersected by fiords, and includes many islands. The region is almost uninhabited. In future years the forests may prove a source of wealth but the region suffers from excessive rainfall. Sheep farming is carried on near the south of the region in the windy land of *Tierra del Fuego* where *Punta Arenas* is the southernmost town in the world.

BOLIVIA

Bolivia is a large but backward state and the majority of the people are native Indians. It consists of two regions:

(a) The western region, a great plateau (Plateau of *Titicaca*) at an elevation of 12,000 feet (compare *Tibet*) partly with an inland drainage into *Lake Titicaca*. This plateau is located where the Andes are at their broadest. It is rich in minerals, especially tin and silver ores, but only those born in the country find it easy to work at such a great height above sea-level. The minerals have to be exported through the ports of *Mollendo* in *Peru*, or *Arica* and *Antofagasta* in *Chile*. Bolivia produces a quarter of the world's tin, mainly from the mine near *Oruro*.

(b) The eastern region, sloping down to the valleys of the *Amazon Basin*, has the equatorial climate and natural resources of the *Amazon Basin*, except that the elevation for the most

part is greater. The region is known as the Montana. Its natural outlet is through Brazil by river. In the south-east some of the lower ground is drained by tributaries of the Paraguay river and forms part of the Gran Chaco. Here there are

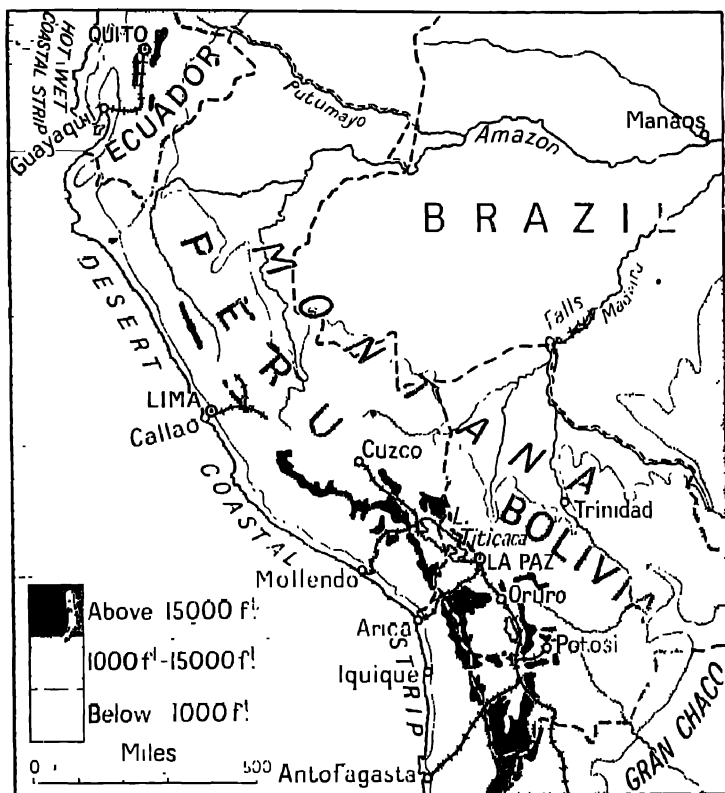


FIG. S.A.19.—Map of Peru, Bolivia, and Ecuador.

oil reserves and a war was waged with Paraguay in 1933–1935 to determine its ownership.

PERU

Like Bolivia, Peru consists of part of the Andean tableland and the Montana. Peru, however, has the advantage of possessing a strip of the Pacific coastal plain.

Although it is a desert, the coastal strip is the most important region of Peru. Irrigation can be practised there, and the production of sugar and cotton has so increased that there is considerable export. *Lima*, the capital, is in this belt, and *Callao* is its port only a few miles away. In the northern part of the coastal belt oil was discovered and is now the leading export of the country. *Mollende*, to the south, is the port for Bolivia. As in Bolivia, the Andean Region is rich in minerals (copper, silver, lead, and gold), and in this region the llama is valued as a transport animal and for its wool, whilst the alpaca also yields valuable wool. The Montana Region is still undeveloped.

ECUADOR

Ecuador falls within the same three natural regions as Peru, but here the coastal strip receives a good rainfall and the production of cocoa is important especially near the port of Guayaquil. Quito, the capital, is almost on the equator, but is at a height of 9,000 feet above sea-level and has an average temperature of only 55°. Places on the sea-coast near the equator have an average temperature of about 80°, with very little range. Quito, too, has an extraordinarily small range, less than 1°.

COLOMBIA

Colombia is at the northern end of the main chain of the Andes, and there the mountains have split into four branches. The natural regions into which the country can be divided are as follows:

(a) The lowlands of the north coast and the main valleys between the Andean chains. The most important valleys are those of the Magdalena and Cauca. The climate varies with elevation; on low ground it is equatorial, with the usual products such as cocoa, sugar, cotton, and bananas.

(b) The mountain spurs. The slopes between 3,000 and 7,000 feet produce coffee and maize, the former being exported to the United States; higher up wheat and other grains are grown for home use, but lands above 10,000 feet are unin-

habited. *Bogota*, the capital and main centre of population, is on a plateau near the Magdalena Valley.

The minerals of the mountain regions are probably valuable and important oilfields have recently been discovered in the valleys. The Magdalena and Cauca are the great highways, and most of the export trade is through the ports of Cartagena and Baranquilla. "Although Colombia has the advantage of ports on both the Pacific and Atlantic shores, routes *across* the mountains to the Pacific are difficult.

VENEZUELA

Venezuela falls into four natural regions:

(a) The northern coastal lowlands, where the oilfields of the Maracaibo Basin have become very important. Cocoa, bananas, and sugar are also produced.

(b) The mountain spurs and plateaus from the Andes, important for their production of coffee and maize.

(c) The llanos or grassy plains of the Orinoco Basin, devoted largely to cattle, but little developed.

(d) The still unexploited Guiana highlands.

Venezuela has derived great wealth from its oilfields and is a country of contrasts. *Caracas*, the capital lies in a small basin at a height of several thousand feet though less than 20 miles from its port *La Guaira* and is a beautiful city with great modern buildings. Much of the rest of the country is sparsely populated by the backward Indian tribes though modern roads have opened up parts of the hinterland and permitted cotton mills and other factories to be established at places such as Valencia.

THE GUIANAS

The Guianas consist of undeveloped sparsely-populated uplands in the south, rich in minerals and timber, and tropical, almost equatorial, lowlands along the coasts. They comprise British, Dutch and French Guiana, each with important rivers draining from the interior. Gold and diamonds are important products, but recently there has been a large output of bauxite

(sent to Canada for extraction of aluminium) and iron ore. Sugar and rice are produced on the coastal lowlands. Georgetown, the capital of British Guiana, is at the mouth of the Demerara which forms an important routeway into the interior.

TRINIDAD

Trinidad is a small island near the mouth of the Orinoco River. It is a British possession and has very valuable oil-fields and a famous pitch lake which was discovered by Sir Walter Raleigh. The pitch or asphalt is valued for "asphalting" metalled roads. The principal agricultural products are cocoa from sheltered valleys amongst the northern hills and sugar from drier eastern parts.

QUESTIONS AND EXERCISES

1. Describe the Amazon Basin. What are the possibilities of commercial development in this region?

2. What do you know of the nitrate industry of South America? What is its importance to Europe?

3. Describe and account for the distribution of wheatlands in South America, and compare this distribution with the wheatlands of Australia. What steps have been taken for further development of the wheatlands?

4. Write what you know of the livestock industry of the Americas and its distribution.

5. Write a description of the Parana-Paraguay Basin

6. By means of a series of diagrams compare the climates of North America and South America.

7. Compare the causes of the desert regions in South America and Australia. Of what use are the South American deserts to mankind?

8. Compare and contrast the Mediterranean Region of Central Chile with that of California.

9. Write an account of the east coast of South America from the Amazon to Cape Horn, describing with maps the physical features, climate, and productions.

10. Write an account of the mineral wealth of South America. Draw diagrams to show the distribution of important minerals.

11. Write an account of the foreign trade of South America, stating the chief products exported, the countries from which they come, the countries to which they go, and the goods received in exchange.

12. Describe fully the Andean Chain.

13. If you had to go and live in South America, in what country would you settle, and why?

APPENDIX

EXAMINATION PAPERS AND GENERAL QUESTIONS

Mainly taken from public examinations of School Certificate or Matriculation standard.

A. PHYSICAL

1. How is rainfall measured, and how is a rainfall map constructed? Illustrate your answer by drawing and explaining a rainfall sketch-map of any actual country.

2. Write a brief account of the climate of *either* the Temperate Grasslands *or* the Equatorial Forests and indicate where the climate you describe is found.

3. Write a brief account of what you think the Arctic Ocean looks like throughout the year.

4. What is a contour line? Draw a contoured map of an island showing a peak 800 feet high, a bay on the north with cliffs 200 feet high, a pass, and a coastal plain.

5. How are mountains formed? Give examples and diagrams where possible.

6. "Man's character and occupations have been decided by the geographical conditions under which he lives." Examine this statement critically with reference to Englishmen and Africans.

7. How is temperature measured and recorded? What is meant by an isotherm map?

8. Give a brief account of the main wind systems of the earth, noting the causes of the winds and of their variation from one part of the year to another.

9. If the local time in Adelaide is 3 o'clock in the afternoon, what will be the time at a place 30° east of Adelaide? Also what would be the time at a place 30° north of Adelaide? Also at a place 45° west of Adelaide? Account for these differences.

10. In what different ways may lakes be formed? Give an example of each type you mention.

11. Near the coast of a certain land there is a mountain system consisting of ~~three~~ parallel ranges. The outer range is about 1,500 feet high the ~~middle~~ one 2,000 feet high; the inner one 3,000 feet high. Between the outer range and the sea is a narrow coastal plain. Between the outer and middle ranges is a valley whose bottom is 1,000 feet above sea-level. Between the middle and inner ranges is a valley whose bottom is 1,500 feet above sea-level. Behind the inner range is a plateau averaging 2,000 feet

above sea-level. Draw as accurately as you can a section through country from the sea to the plateau.

12. What is meant by Monsoons and how are they caused? Discuss the above with special reference to India.

13. What are the different types of current and how do they originate? Illustrate the main warm currents on a sketch-map of the world. How do they influence the climate of the neighbouring countries in each case?

14. Explain any five of the following, giving examples and sketches wherever necessary:

Weathering, earth-pillar, sand-dune, terminal moraine, continental shelf, artesian well, spring tide.

15. Describe the wind systems of the world with diagrams, giving their causes and effects. How do they affect the climatic conditions of South America?

16. Describe the work of running water as an agent of denudation, transport, and deposition. Compare and contrast the work of a river with that of a glacier.

17. Explain carefully and in detail why the captain of a ship takes a chronometer (accurate clock) with him when he goes to sea, and also why he takes a sextant.

18. What is an isotherm? Explain how an annual isotherm chart is constructed, stating what observations have to be made. On such a chart of the world it is noticed that the isotherms run approximately in the direction of the parallels of latitude. Explain this fact, and state (with reasons) any marked exception to it that you know of.

19. Certain parts of the world have rain in winter but very little or no rain in summer. Name these parts of the world, and explain fully why their rainfall is thus distributed.

20. Certain coasts in the world are deserts. Name them, and taking each one separately, explain why desert conditions prevail.

21. Draw a contoured map (imaginary) of an easy pass from a town at 220 feet over a ridge about 500 feet high to the coast on the other side. How high is your pass?

22. Describe fully the cause, nature, position, and effects of two ocean currents which have a marked influence on the climate of the countries whose shores they wash.

23. What are sedimentary rocks? In what different ways may they be formed, and how do they come to form part of the land masses?

24. Describe carefully the conditions necessary for the growth of three important food grains of the world, and give a brief account of their distribution.

B. GENERAL AND ECONOMIC

1. South-East Australia has a heavy rainfall. How has it benefited this part more than other parts of Australia?

2. Draw a sketch-map of Australia showing the rivers and mountains.

Mark those areas which have no rivers reaching the sea. Why is it a disadvantage that so much of Australia is an area of inland drainage?

3. What has made Cape Town a great trading port? Name some countries which trade with Cape Town, and the articles in which they trade.

4. New Zealand is a part of the British Commonwealth. Point out how New Zealand helps other parts of the Commonwealth and is helped by them.

5. A traveller from Adelaide wants to go to England. By what different routes can he make that journey? Which route should he choose if he wants to reach England in the shortest time?

6. If you take a coastal trip from Cairns to Fremantle, what important ports will you pass? Describe the industries in which people are engaged at each one.

7. Write an account of the occupations of the people of Australia using the headings—

(1) Sheep-rearing—where it is carried on—the difficulties the people have to deal with—what products are obtained from the sheep and sold.

(2) Crops grown—names of things grown and where they are grown.

(3) Minerals—names of minerals—where they are found.

Illustrate your answer with a sketch-map if you can.

8. Divide South Africa into natural regions, giving reasons for your divisions.

9. Describe the physical features, climate, and vegetation of the Orange River Basin.

10. Compare and contrast Victoria and New South Wales with the Cape Province of the Union of South Africa.

11. Draw a sketch-map showing the principal physical features of South America. Put in at least one line of longitude and two of latitude.

12. Write brief notes on each of the following cities, noting especially the reasons for their having become the capitals of their respective countries: London, Paris, Madrid, Vienna, Buenos Aires, and Canberra.

13. Why is there an industrial region in the north-eastern part of the United States? What are the chief industries carried on there?

14. What food grains are grown in India and Burma? Show by sketch-maps where they are grown; indicating from which regions and by what routes the surplus, if any, is exported.

15. What are the chief exports from the British Isles? Where in the British Isles are they produced?

16. If you were forced to leave your home for good, in what country would you settle, why would you choose it, and what would you do there?

17. Show by a sketch-map the more important railways of either India or Australia.

18. What do you understand by the hinterland of a port? Show by reference to ports in Australia how the richness and size of the hinterland influence the importance of the port.

19. Give a description of the route taken by the Canadian Pacific Railway, mentioning the natural regions through which it passes. Point out its commercial importance.

20. Compare and contrast the position, size, climate, and general physical structure of the British Isles and Japan.

21. Draw a sketch-map of *either* France *or* Australia, marking mountains, plateaus over 1,000 feet, and principal rivers.

22. What conditions generally determine a good harbour? How far do these conditions hold good in the case of Durban, Cape Town, East London, and Dunedin?

23. Describe the natural products of the equatorial forests and give an account of their commercial exploitation.

24. Say what you can of the foreign overland trade of India and Burma, and illustrate your answer with a sketch-map.

25. Account for the position and importance of Stamboul (Constantinople), Riga, and Trieste.

26. Describe the caravan trade of North Africa.

27. Give an account of the products, commerce, and trade-connections of Poland.

28. "He that rules the sea rules the commerce of the world." Illustrate the truth of this statement with reference to England.

29. Write an account of the productions of India using these headings—

(1) Crops used for food—where they are grown.

(2) Crops not used for food—where they are grown.

(3) Minerals—names of minerals found—where each is found.

(4) What happens to the crops which are grown for food.

(5) What the crops which are not eaten are used for.

Illustrate your answer with a map if you can.

30. Describe a journey from Beira to London using three headings—

(1) What cargo is put into the steamer at Beira—where each thing comes from—where it is going to.

(2) Stopping-places on the way—number of days between each port, and total number of days spent on the journey.

(3) What new cargo is taken on at each stopping-place.

(4) The journey takes place in December. What differences would the passengers notice if they travelled in August?

31. Write an account of *either* the people who live in the cold forests of Russia and Northern Siberia, *or* the Kaffirs who live in the grasslands of South Africa, using the headings—

(1) Where they live—climatic and other conditions.

(2) The house they live in—their clothes—their food.

(3) Their occupations—brief description of how they carry them on.

(4) How they travel.

Illustrate your answer, if you can, with drawings of their houses, weapons, and anything else interesting.

32. Why are wheat, rubber, jute, and tea not grown on the South African plateau? Name the countries where they are produced.

33. What and where are the following or for what are they important? Bristol; Perth; Denmark; Pretoria; Chicago; Montreal; Benares; Suez; Malta.

34. The mountains of eastern Australia run north and south. If they ran east and west, what physical changes would have resulted?

35. Discuss briefly the factors which determine the natural regions of Canada, illustrating your answer by sketch-maps, and conclude your work by marking on an outline map of Canada its natural regions.

36. "There are regions with well-marked dry and rainy seasons, the latter occurring in the summer months. The usual vegetation is savana, but in the wetter places such as the river-sides there is forest. In the highlands also, where there are relief rains, forest occurs. On the grasslands both cattle-rearing and agriculture can be carried on, although for the latter irrigation is sometimes necessary. Among the crops are maize, millet, cotton, and tropical fruits. These regions can be made very productive, and the higher-lying parts are suitable for European colonies."

(a) What is the "Natural Region Type" described in this paragraph?

(b) Give the names and positions of all the examples of this type of region that you know.

(c) Select any one example, draw a sketch-map of it, and write a paragraph describing it.

37. Name what you think are the natural regions of South Africa, and indicate the characteristics in the climate of each.

38. Draw a rainfall map of Canada and explain it. *Or,*

Into how many typical climatic regions can you divide Europe? Write a brief note on the special characteristics of each, and their influences on vegetation.

39. Draw a map of Tibet and write an account of the country under the headings: position and size, physical features, climate, people (life, work, and customs), exploration. *Or,*

Write a short note on the Panama Canal and its influence on International Commerce, particularly with the East.

40. Give an account of what is known as West Africa under the headings: physical features, climate, people, products, development.

41. Draw diagram maps showing the immediate environments of the following towns, and write a note on each, explaining how its geographical situation is a favourable (or an unfavourable) one: Khartoum, Lyons, Rangoon, Vienna, Basra.

42. Divide Australia into natural regions, and name the chief agricultural products of each of them.

43. In certain parts of the world the people are engaged in only one occupation—stock-raising. Name these parts of the world, and explain why the rearing of cattle is the only occupation. *Or,*

Give a short account of the trade relationship between England and

South Africa, and estimate the commercial importance of South Africa to the Commonwealth.

44. Why are the best railway engines in Europe not the largest in the world? Why have ships been built larger and larger since steel was invented? Why are the liners sailing from Europe to America larger than those sailing to India? Why are there five railways across the Rockies but only one across the Andes? Why do not engineers remove cataracts in rivers and so make them navigable? Or,

Mention and account for the principal wheat and wine growing regions of Europe.

45. Towns spring up at—

- (a) The limit of ocean navigation.
- (b) The limit of river navigation.
- (c) At bends in rivers.
- (d) At the confluence of two rivers.
- (e) At waterfalls.

Give two examples of each of these, drawing a small heat diagram for each town showing the advantages of its position.

46. Has the North or the South Atlantic the more suitable positions for ports? Why? Is this the only reason why one ocean has so many more ports than the other?

47. What is a natural region? Divide North America into major natural regions and give a brief description of any one.

48. "In Monsoon lands the areas of densest population and heaviest rainfall frequently coincide." Show with the aid of sketch-maps how far this is true of India, and why

49. Discuss fully the relative advantages of Canberra, Melbourne, and Sydney as capitals of the Australian Commonwealth.

50. Give an account of the essential features of the geography of the arid centre of Australia.

51. Describe by the use of diagrams the broad features of the climate of Asia throughout the year.

52. Write a brief account of the economic development of the Argentine.

53. How is coal formed? Say what you know of the disposition and importance of the coalfields of Great Britain.

54. Describe briefly the mountain systems of Europe.

55. Compare and contrast the basin of the Murray-Darling with that of the Congo.

56. Write a general account of the rivers of Australia or New Zealand, with special reference to their usefulness to man.

57. Give an account of agriculture in Victoria.

58. Describe the character and causes of a Mediterranean climate; discuss its world distribution.

59. What areas in Europe grow (a) wheat, (b) maize, (c) fruit, respectively, for export? Give geographical factors that have favoured the production of these materials in the countries you mention.

60. Discuss the geographical factors that have led to the growth of (a) Constantinople, (b) Berlin, (c) Antwerp. Specify the commercial activities of each city.
61. Describe the distribution of forests in Europe with special reference to the areas in which these are utilised for timber.
62. Show with the aid of sketch-maps that two or more important routes across the main land mass of Europe converge on (a) the Gulf of Lyons, (b) the head of the Adriatic, (c) the north-western end of the Black Sea.
63. Contrast Denmark with the peninsular part of Italy from the standpoint of the geographical conditions and the resulting industries.
64. Into what natural regions may Central Europe be divided? State clearly in what respects these regions differ from one another in (a) climate, (b) natural products.
65. What do you understand by the following: the Steppes, the Polders, the Karst? Where in Europe do these occur? Give a detailed account of the economic geography of one of them.
66. Show that (a) the arrangement of the land mass with reference to the sea, and (b) the position of the navigable rivers, make Europe a continent of easy communication.
67. Discuss with special reference to the differing geographical conditions the points of contrast between the agricultural industries of the Central European Plain and those of the Mediterranean Peninsula.
68. Compare and contrast the tropical section of Africa with that of South America with reference to climatic and vegetational zones, adding the reasons for any striking points of contrast.
69. What are the reasons for the following:
 - (a) Great floods on the Mississippi;
 - (b) Chinook winds of Alberta;
 - (c) Icebergs in spring on the North Atlantic route?
70. Account as fully as possible for the great differences in the density of population in Chinese Asia.
71. Discuss the present-day importance of tropical islands in the British Empire as sources of food products and raw materials.
72. Show that the Commonwealth of Australia furnishes good examples of a number of distinct types of climate.
73. What are the geographical conditions best suited for the growing of cotton? Where are these conditions to be found? Give an account of what is done with the cotton grown in the regions you mention.
74. What are the factors that influence the quantity of water in a river? Discuss these with special reference to (a) the Nile, (b) the Amazon.
75. Show with the aid of sketches and graphs how the climate of India varies from season to season in the course of a year.
76. Give a brief survey of the climate, resources, and human activities of New Zealand.
77. Into what major natural regions can South America be divided? State briefly the main agricultural and pastoral activities in these regions.

78. Give details of the measurements and observations a sailor has to make in order to determine (a) the longitude, (b) the latitude, of the position of his ship. Explain the underlying principle of each method you describe.

79. Discuss the geographical conditions of *three* of the following areas: Queensland, Egypt, Japan, British Malaya, so as to explain how each area is suited for its leading industry.

80. Compare and contrast the eastern and western portions of the Mississippi basin as to relief, resources, and industries.

81. Give a summary of the main activities of the population of the La Plata region, and give the geographical factors that have influenced the industries of this region.

82. Write a summary of (a) the climate, (b) the natural resources, and (c) the human activities, in Ceylon, or Tasmania, or Jamaica.

83. Compare the natural regions of Australia with those of Africa south of the Equator. Account for the fact that some of these regions have not developed commercially whereas others have not.

84. What are the geographical factors that have influenced the growth and present day importance of (a) Cairo, (b) Bombay, (c) Philadelphia, (d) Vancouver?

85. Show how the East Coast Route from London to Edinburgh is related to the relief of the land.

86. Locate the chief manufacturing regions of France. What geographical conditions have favoured their development?

87. Describe the distribution of population in Rumania. Account as fully as you can for the facts you describe.

88. "Scotland is a land of contrasts." Give reasons which appear to justify the use of this expression.

89. Name the characteristic type of farming in *three* of the following districts: Romney Marsh, the Fens, Oxford Clay Vale, East Anglia, Northern Ireland. What advantages does each of the selected areas possess for carrying on this particular type of farming?

90. Show, by sketch maps, the sites of Limerick, Newcastle, Gloucester, and Liverpool, and explain how the site has influenced the growth of the port in each case.

91. What are the chief physical regions of *either* Italy *or* Spain? Discuss *one* of these physical regions with regard to (a) its climate, (b) its soil, (c) its human activities.

92. Select any two countries in Europe where water-power is important, and describe the use to which it is put in each case.

93. Draw a large sketch map of the Rhine and its more important tributaries. Shade the highland areas and indicate the traffic routes from the river to the basins of the Seine, Rhone and Danube respectively.

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